Cold Storage Envelope Specification

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Details

Cold Storage Envelope Specification

June 2016

Information contained herein describes minimum requirements pertaining to cold storage/freezer facilities by which a Versico Roofing and Vapor Seal Warranty can be issued. Due to unique nature of this type of facility, contractors are encouraged to submit project specifications and details for review to ensure an uninterrupted and continuous vapor seal is achieved and the specified warranty prerequisites have been met.

PART I GENERAL

Refrigerated facilities are any buildings or sections of a building that achieve controlled storage conditions using refrigeration. Two basic storage facilities are **coolers** that protect commodities at temperatures usually above 32° F and **low-temperature rooms** (freezers) operating under 32° F to prevent spoilage or to maintain or extend product life.

1.01 SCOPE OF WORK

This specification outlines design, application, and products utilized in cold storage and freezer facilities to achieve an uninterrupted or continuous vapor seal and obtain the applicable Versico Roofing and Vapor Seal Warranty. The cold storage/freezer envelope system consists of:

A. **Fully Adhered, Mechanically Attached, or Ballasted roofing assemblies** that incorporate EPDM, TPO or VersiFleece membrane. All components including insulation, adhesives, edging, and associated vapor seal accessories are available from Versico for Total System Warranty coverage.

B. **Below slab thermal protection/vapor seal –** the system is comprised of a continuous vapor barrier, multiple layers of polystyrene insulation, and a slip-sheet all supplied by Versico. Quick Applied Cured Curb Flashing is used in conjunction with Water Cut-Off Mastic to provide a continuous vapor seal against the insulated exterior wall panel.

C. **Exterior Wall Panel Corner Flashing** – Quick Applied uncured EPDM Flashing is used in conjunction with V-150 Primer to provide a vapor seal at the corners of the insulated wall panel system beneath the exterior metal trim.

Refer to Paragraph 1.02, Design Options, for specific information.

1.02 DESIGN OPTIONS

A. **Roofing Assemblies**

Various Versico roofing assemblies are available for use on cold storage or freezer facilities. The specifier or the cold storage contractor may select an option perfectly suited for the project conditions, regional requirements, and structural load capacity. VersiGard black EPDM, VersiGard White EPDM, or VersiWeld TPO membranes may be incorporated depending on preference. Ballasted EPDM assemblies are also available for projects where structural load can accommodate such an assembly.

Insulation in all assemblies, except Ballasted Assemblies, may be mechanically fastened, attached with a full spray of DASH Adhesive, or set in beads of adhesive.

1. **VersiFleece Adhered Assemblies**

   a. **VersiFleece TPO – Fully Adhered Roofing System** incorporates 45, 60 or 80-mil thick, scrim-reinforced, white, gray or tan VersiWeld Thermoplastic Polyolefin (TPO) membrane laminated to a 55-mil thick non-woven polyester fleece-backing resulting in a total finished sheet thickness of 100, 115 or 135-mils.

   b. The membrane is fully adhered to an acceptable insulation with a spray or extrusion applied, two-component, low-rise DASH™ Adhesive. Adjoining sheets of VersiFleece membrane are overlapped and joined together with a minimum 1-1/2" wide hot air weld.

   c. For specific installation requirements pertaining to VersiFleece Adhered Membrane Assemblies, refer to the applicable VersiFleece specification included in the Versico technical manual.

2. **Conventional Adhered Assemblies**

   a. **VersiGard EPDM – Adhered Roofing System** incorporates VersiGard (black or white-on-black) 60-mil or 90-mil thick non-reinforced EPDM or VersiGard (black) 45, 60 or 75-mil thick reinforced EPDM membrane. The EPDM membrane is fully adhered to an acceptable insulation with Versico's EPDM Bonding Adhesive (Versico's G200SA Substrate Adhesive, Low-VOC Bonding Adhesive or Versico Water Based Adhesive). Adjoining sheets of EPDM membrane are spliced together using 3" or 6" wide QA Seam Tape and Primer or factory-applied QA Seam Tape (VersiGard QAT) and Primer.

   b. **VersiWeld TPO - Adhered Roofing System** incorporates white, gray or tan 45, 60 or 80-mil thick, scrim-reinforced VersiWeld Thermoplastic Polyolefin (TPO) membrane. The membrane is fully adhered to an acceptable insulation with the appropriate VersiWeld Bonding Adhesive. Adjoining sheets of membrane are overlapped approximately 2" and joined together with a minimum 1-1/2" wide heat weld.

   c. For specific installation requirements pertaining to Conventional Adhered Membrane Assemblies, refer to the applicable Adhered Roofing System specification included in the Versico technical manual.

3. **VersiWeld QA (Quick Applied) TPO**

   The Versico VersiWeld QA (Quick-Applied) TPO Membrane Application incorporates 60-mil thick, scrim reinforced, white, VersiWeld Thermoplastic Polyolefin (TPO) membrane laminated to an elastomeric pressure-sensitive adhesive. The membrane is fully adhered to an acceptable insulation using the factory-applied adhesive and adjoining sheets are overlapped approximately 2" and joined together with a minimum 1-1/2" wide hot air weld.

   For specific installation requirements pertaining to the Versico VersiWeld QA TPO Membrane Application, refer to the VersiWeld Adhered Roofing System specification included in the Versico technical manual.

4. **Mechanically Fastened Assemblies**

   a. **VersiGard Reinforced EPDM Mechanically Attached Roofing System** incorporates VersiGard (black) 45, 60 or 75-mil thick reinforced EPDM membrane. The reinforced membrane is mechanically fastened with the appropriate Versico Fastener and 2"

diameter Fastening Plates or Fastening Bars secured 6" minimum to 12" maximum on center, depending on project criteria, along the center of the membrane splice. Adjoining sheets of EPDM membrane are spliced together using 3” or 6" wide Factory-Applied QA Seam Tape in conjunction with Primer.

b. **VersiWeld TPO Mechanically Attached Roofing System** incorporates white, tan or gray 45, 60 or 80-mil thick scrim-reinforced, VersiWeld Thermoplastic Polyolefin (TPO) membrane field sheets. The reinforced TPO membrane is mechanically fastened to the roof deck with the appropriate Versico Fasteners and Fastening Plates. Adjoining sheets of VersiWeld membrane are overlapped and joined together with a minimum 1-1/2" wide heat weld.

c. For specific installation requirements pertaining to Mechanically Attached Assemblies, refer to the applicable Mechanically Attached specification included in the Versico technical manual.

5. **Ballasted Roofing Assemblies**

Loose Laid Ballasted Roofing System incorporates 45 or 60-mil thick VersiGard (black) non-reinforced or minimum 60-mil VersiGard (black) reinforced EPDM membrane. Both the EPDM membrane and an acceptable insulation are loose laid over the substrate and held in place with a minimum of 10 pounds of ballast per square foot depending upon wind load requirements. Adjoining sheets of EPDM membrane are spliced together using 3” or 6” wide QA Seam Tape and Primer or factory-applied QA Seam Tape (VersiGard QAT) and Primer.

For specific installation requirements pertaining to Ballasted Roofing Assemblies, refer to the VersiGard Loose-Laid Ballasted Roofing System specification included in the Versico technical manual.

B. **Below Slab Thermal Protection**

No special under-floor treatment is required for refrigerated facilities held above freezing. A below-the-floor vapor retarder, in conjunction with insulation, is needed in facilities held below freezing.

Over the cured mud slab, Versico VersiGard 45-mil non-reinforced EPDM is used as a vapor barrier and is installed loosely laid with continuously sealed joints and junctions and overlaid with multiple layers (2 layer minimum) of loosely laid InsulFoam Expanded Polystyrene (EPS) (40 psi compressive strength) or Foamular 400 Extruded Polystyrene (XPS) insulation, supplied by Versico. The insulation is overlaid with a slip-sheet of 16-mil CCW Root Barrier or 70-mil CCW MiraPly-H prior to pouring the concrete floor slab.

1. All overlaps of the slip-sheet and the vapor barrier must be sealed with Versico QA Seam Tape.

2. Terminate vapor barrier transition to the exterior wall panel as shown on the appropriate detail using Versico Pressure-Sensitive Curb Flashing and VersiGard Water Cut-Off Mastic.

Caution: To prevent floor frost heaving that may result from moisture in the subsoil, in warmer climates under floor tubes vented to ambient air may be sufficient to prevent heaving. Artificial heating, either by air circulated through under floor ducts or by glycol circulated through plastic pipe, is the preferred method to prevent frost heaving. Electric heating cables installed under the floor can also be used to prevent frost formation. The choice of heating method depends on energy cost, reliability, and maintenance requirements. Air duct systems should be screened to keep rodents out and sloped for drainage to remove condensation.

The concrete slab will contract during pulldown, causing slab/wall joints, contraction joints, and other construction joints to open. At the end of the holding period (i.e., at 35° F), any necessary caulking should be done.

Consult specifier and refer to the ASHRAE Refrigeration Handbook, chapter 13, for specific recommendations.

C. **Insulated Metal Wall Panels Corner Junction**

To ensure a continuous vapor seal, Quick-Applied Uncured EPDM Flashing (12" wide minimum) in conjunction with V-150 or Low VOC EPDM Primer is used along the entire wall panel corner extending to the wall to roof vapor barrier transition. For freezers, the flashing must also extend to the under floor vapor barrier transition.

Cover all exposed flashing with sheet metal trim secured following insulated metal wall panel manufacturer's recommendation and sealed accordingly.

1.03 QUALITY ASSURANCE

Cold storage, more than most construction, requires correct design, quality materials, good workmanship, and close supervision. Design should ensure that proper installation can be accomplished under various adverse job site conditions. Materials must be compatible with each other. Installation must be made by careful workers directed by an experienced, well-trained superintendent. Close cooperation between the general, roofing, insulation, and other contractors increases the likelihood of a successful installation.

A. The cold storage/freezer envelope system must be installed by a Versico Authorized Contractor in compliance with shop drawings as approved by Versico. There must be no deviations made without **PRIOR WRITTEN APPROVAL** of Versico.

B. Upon completion of the installation, an inspection will be conducted by a Field Service Representative of Versico to ascertain the roofing system has been installed according to Versico's specifications and details.

C. In the United States, the U.S. Public Health Service Food and Drug Administration developed the Food Code (FDA 1997), which consists of model requirements for safeguarding public health and ensuring that food is unadulterated. The code is a guide for establishing standards for all phases of handling refrigerated foods. These standards must be recognized in the design and operation of refrigerated storage facilities.

D. Regulations of the Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), the U.S. Department of Agriculture (USDA), and other standards must also be followed.

E. Incorrect design and poor installation can cause moist air leakage into the facility, resulting in frost and ice formation, energy loss and, eventually, expensive repairs.

F. A continuous and uninterrupted vapor/air seal must encapsulate the building structure to prevent warm, humid air from infiltrating the roof assembly around the perimeter and penetrations. In freezer applications the vapor barrier under the floor slab must provide a sealed transition to prevent air leakage at the insulated wall panel/floor junction.

G. Cold storage facilities can change in dimension due to settling, temperature change, and other factors; therefore, cold storage facilities should be inspected regularly to spot problems early, so that preventive maintenance can be performed in time to avert serious damage.

1.04 SUBMITTALS

A. To ensure compliance with Versico's minimum warranty requirements, the following projects should be forwarded to Versico for review prior to installation, preferably prior to bid:

1. Projects where the roofing membrane is expected to come in direct contact with petroleum-based products or other chemicals.

2. New construction freezer projects where a below slab thermal protection system is to be installed. In addition to the roofing warranty, these projects could qualify for a 5-year vapor seal warranty.

3. Projects with extended wind speed coverage that may require different enhancements than those listed as part of the applicable Versico roofing system specification.

4. Projects with unusual conditions, special warranty, or those with warranties greater than 20 years.

B. Shop drawings must be submitted to Versico by the Versico Authorized Roofing Contractor along with a completely executed Job Approval Request (Copy-A) for approval. Approved shop drawings are required for inspection of the roof and on projects where on-site technical assistance is requested.

Shop drawings must include:

1. Outline of roof and size
2. Deck type (for multiple deck types)
3. Location and type of all penetrations
4. Perimeter and penetration details
5. Vapor seal details at roof and floor junction (if applicable)

When field conditions necessitate modifications to the originally approved shop drawings, a copy of the shop drawing outlining all modifications must be submitted to Versico for revision and approval prior to inspection and warranty issuance.

C. **Job Completion Date** (Copy-B)

After project completion, a Notice of Completion must be submitted to Versico to schedule the necessary inspection and acceptance of the project prior to issuance of the Versico warranty.

D. **As-Built Projects** (roofing systems installed prior to project approval by Versico)

The Versico Authorized Contractor may supply Versico with an As-Built drawing for a project completed prior to Versico's approval. The As-Built drawings:

1. Must conform to Versico's most current published specifications and details applicable at the time of bid.

2. Must be submitted along with a completely executed Notice of Completion.

3. Must include the items identified in Paragraph 1.04.B above.

1.05 WARRANTY

A. **Roofing System Warranty**

A 10-year Membrane System or 10, 15 or 20-year Total System Warranty is available for the roofing assembly as outlined in the applicable roofing system specification contained in the Versico technical manual.

In addition to the above, special coverage against puncture or hail is also available depending on the type and thickness of membrane used. Refer to Versico published specifications or contact Versico for requirements.

B. **Vapor Seal Warranty**

1. **Projects with a non-Total System Roofing Warranty**, a **3-year Vapor Seal Warranty** covering air infiltration along the perimeter is available for an additional charge.

2. **Projects with a Total System Roofing Warranty**, a **5-year Vapor Seal Warranty** covering air infiltration along the perimeter is available at no charge for 10, 15, or 20-year Total Roofing System Warranties. This coverage requires the use of Versico metal and strict compliance with Versico details specifically approved for the project.

1.06 JOB CONDITIONS

A. All steel beams, columns, and large pipes that project through the insulation should be vapor-sealed and insulated with a 4-foot high wrap of insulation. The height of insulation at conduits, small pipes, and rods should be four times the regular wall insulation thickness. In both cases, the thickness of insulation on the projection should be half that on the regular wall or ceiling.

B. Coordination between trades is essential to avoid unnecessary rooftop traffic over sections of the roof and to prevent damage to the membrane.

C. Wall construction must be designed so that as few structural members as possible penetrate the insulation envelope. Insulated panels applied to the outside of the structural frame prevent conduction through the framing. Where masonry or concrete wall construction is used, structural framing must be independent of the exterior wall. The exterior wall cannot be used as a bearing wall unless a suspended insulated ceiling is used.

D. Where interior insulated partitions are required, a double column arrangement at the partition prevents structural members from penetrating the wall insulation. For satisfactory operation and long life of the insulation structure, envelope construction should be used wherever possible.

1.07 CAUTIONS AND WARNINGS

A. Safety Data Sheets (SDS) must be on location at all times during transportation, storage and application of materials. The contractor shall follow all safety regulations as recommended by OSHA and other agencies having jurisdiction.

B. Wearing slab heating under the dock area in front of the freezer doors will help eliminate moisture at the door and floor joints.

C. Electrically operated material-handling equipment is used to eliminate inherent safety hazards of combustion-type equipment. Battery-charging areas should be designed with high roofs and must be ventilated due to the potential for combustible fumes resulting from the charging activity.

D. Condensation at the envelope is usually caused by high humidity and inadequate ventilation. Poor ventilation occurs most often within a dead air space such as a ceiling plenum, hollow masonry unit, through-metal structure, or beam cavity. All closed air spaces should be eliminated, except those large enough to be ventilated adequately. Ceiling plenums, for instance, are best ventilated by mechanical vents that move air above the envelope.

E. Other considerations include the following:

1. Vapor retardants should be placed on the warm side of insulation systems. Most often the roofing membrane will serve as a vapor barrier.

2. Prefabricated, self-locking wall panels also serve as vapor barriers.

3. In new construction, when working in colder temperatures, curing of concrete floors and the use of propane heaters to accelerate dehydration will cause construction-generated moisture to be driven upward into the roofing assembly due to the lack of ventilation. In such cases, the use of a vapor retarder/barrier beneath the roofing insulation is strongly recommended to reduce the potential for condensation and the possible phenomenon of frozen blocks of insulation that may occur during temperature pull down.

F. **Temperature Pulldown**

1. Because of the low temperatures in freezer facilities, contraction of structural members in these spaces will be substantially greater than in any surrounding ambient or cooler facilities. Therefore, contraction joints must be properly designed to prevent structural damage during facility pulldown.

2. The first stage of temperature reduction should be from ambient down to 35° F at whatever rate of reduction the refrigeration system can achieve.

3. The room should then be held at that temperature until it is dry. Finishes are especially subject to damage when temperatures are lowered too rapidly. Portland cement plaster should be fully cured before the room is refrigerated.

4. If there is a possibility that the room is airtight (most likely for small rooms, 20 feet by 20 feet maximum), swinging doors should be partially open during pulldown to relieve the internal vacuum caused by the cooling of the air, or vents should be provided. Permanent air relief vents are needed for continual operation of defrosts in small rooms with only swinging doors. Both conditions of possible air heating during defrost and cooling should be considered in design of air vents and reliefs.

5. The concrete slab will contract during pulldown, causing slab/wall joints, contraction joints, and other construction joints to open. At the end of the holding period (i.e., at 35° F), any necessary caulking should be done.

6. An average time for achieving dryness is 72 hours. However, there are indicators that may be used, such as watching the rate of frost formation on the coils or measuring the rate of moisture removal by capturing the condensation during defrost.

7. After the refrigerated room is dry, the temperature can then be reduced again at whatever rate the refrigeration equipment can achieve until the operating temperature is reached. Rates of 10° F per day have been used in the past, but if care has been taken to remove all the construction moisture in the previous steps, faster rates are possible without damage.

G. To eliminate flexure of the roof structure or overhead members and simplifies maintenance, cold room meat tracking, wherever possible, should be erected and supported within the insulated structure, entirely independent of the building itself.

PART II PRODUCTS

2.01 General

This section lists and describes products manufactured or marketed by Versico.

The components of the cold storage envelope are to be products of Versico or accepted by Versico as compatible. The installation, performance or integrity of products by others, **when selected by the specifier and accepted as compatible by Versico**, is not the responsibility of Versico and is expressly disclaimed by the Versico Warranty.

Consult the Versico Technical Data Bulletins for the shelf life limitation, coverage rates and application procedures of each product. Refer to the manufacturer's Safety Data Sheets for applicable precautions and warnings prior to the use of any product.

2.02 Membranes

A. **VERSIGARD®/VERSIGARD (WHITE) Non-Reinforced AND VERSIGARD Reinforced EPDM MEMBRANES**

1. Cured non-reinforced or reinforced EPDM (Ethylene, Propylene, Diene Terpolymer) compounded elastomer.

   Non-Reinforced EPDM membrane is available in **VersiGard (black)** or **VersiGard (white-on-black)**. VersiGard membrane must be installed with the white surface facing up and is used for Fully Adhered applications.

2. **VersiGard Clean (black) EPDM Membrane** (mica dust has been removed during manufacturing) is available in 45-mil, 60-mil and 90-mil thicknesses up to 10' wide. Refer to applicable "Application" sections for installation procedures. Factory-Applied QA Seam Tape (3" or 6" wide) is also available.

3. Membrane is available in various sizes as outlined below.

   a. **Non-Reinforced EPDM Membrane -** conforms to ASTM D4637, Type I

      VersiGard (black) 45 or 60-mil thick non-reinforced EPDM membrane - maximum 50' wide, maximum 100' long (additional lengths available dependent on membrane thickness and width) and **90-mil thick non-reinforced EPDM membrane** is available maximum 10' wide, maximum 100' long.

      VersiGard (white-on-black) 60-mil or 90-mil thick non-reinforced EPDM membrane - maximum 10' wide, maximum 100' long.

   b. **VersiGard Reinforced EPDM Membrane (black only) -** conforms to ASTM D4637, Type II

      VersiGard 45, 60 and 75-mil thick reinforced EPDM membrane –4-1/2', 6-1/2', 8' (45 and 60-mil only) or 10' wide, maximum 100' long, reinforced membrane (10' wide 45-mil thick membrane is also available in lengths of 200') with polyester fabric.

Refer to the physical properties listed on the following pages.

VERSIGARD (Black and White on Black)
45-, 60- and 90-MIL THICK NON-REINFORCED EPDM MEMBRANE
STANDARD AND FIRE RETARDANT (FR)

45-mil thick (black) non-reinforced EPDM membrane is used for VersiGard Design "B" Loose Laid Ballasted Roofing Systems

60 or 90-mil thick (black and white on black) non-reinforced FR (Fire Retardant) EPDM membrane is used primarily for the VersiGard Adhered Roofing System. This membrane can also be used for the VersiGard Design "B" Roofing Systems.

Note: Although 60 and 90-mil thick Non-Reinforced EPDM is recommended for Adhered Roofing Systems, 45-mil thick FR Non-Reinforced EPDM may be utilized, **if specified**.

VERSIGARD BLACK/VERSIGARD WHITE NON-REINFORCED MEMBRANES						
Physical Property	**Test Method**	**ASTM SPEC. (Pass)**	**Typical**			
			45-mil	**60-mil**	**60-mil**	**90-mil**
			FR	**FR**	**VersiGard White**	**VersiGard Black FR/ VersiGard White**
Tolerance on Nominal Thickness, %	ASTM D 412	±10	±10	±10	±10	±10
Weight, lb./ft² (kg/m²)			0.26 (1.3)	0.35 (1.7)	0.39 (1.9)	0.59 (2.9)**
Tensile Strength, min, psi (MPa)	ASTM D 412	1305 (9)	1600 (11)	1600 (11)	1600 (11)	1600 (11)
Elongation, Ultimate, min, %	ASTM D 412	300	480	465	540	540
Tear Resistance, min, lbf/in (kN/m)	ASTM D 624 (Die C)	150 (26.3)	200 (35.0)	200 (35.0)	200 (35.0)	200 (35.0)
Factory Seam Strength, min.	Modified ASTM D 816	Membrane Rupture	Membrane Rupture	Membrane Rupture	Membrane Rupture	Membrane Rupture
Resistance to Heat Aging* Properties after 4 weeks @ 240°F (116°C)	ASTM D 573					
Tensile Strength, min, psi (MPa)	ASTM D 412	1205 (8.3)	1500 (10.3)	1450 (10)	1345 (9.3)	1450 (10)
Elongation, Ultimate, min, %	ASTM D 412	200	225	280	280	280
Tear Resistance, min, lbf/in (kN/m)	ASTM D 624	125 (21.9)	215 (37.6)	215 (37.6)	185 (32.4)	215 (37.6)
Linear Dimensional Change, max, %	ASTM D 1204	±1.0	-0.4	-0.5	-0.2	-0.5
Ozone Resistance* Condition after exposure to 100 pphm Ozone in air for 168 hours @ 104°F (40°C) Specimen is at 50% strain	ASTM D 1149	No Cracks	No Cracks	No Cracks	No Cracks	No Cracks
Brittleness Temp., max, deg. F (deg. C)*	ASTM D 746	-49 (-45)	-49 (-45)	-49 (-45)	-67 (-55)	-49 (-45)
Resistance to Water Absorption* After 7 days immersion @ 158°F (70°C) Change in mass, max, %	ASTM D 471	+8.0, -2.0	[+2]	[+2]	[+3.3]	[+2.0]
Water Vapor Permeance* max, perm	ASTM E 96 (Proc. B or BW)	0.1	0.05	0.03	0.02	0.03
Resistance to Outdoor (Ultraviolet) Weathering* Xenon-Arc, total radiant exposure at .70 W/m² irradiance, 176°F (80º C) black panel temp.	ASTM D 4637 Conditions	No Cracks No Crazing @7560 kJ/m²	No Cracks No Crazing @41580 kJ/m²	No Cracks No Crazing @41580 kJ/m²	No Cracks No Crazing @25200 kJ/m²	No Cracks No Crazing @41580 kJ/m²(black) @25200 kJ/m² (white)

* Not a Quality Control Test due to the time required for the test or the complexity of the test. However, all tests are run on a statistical basis to ensure overall long-term performance of the sheeting.
** VersiGard White 90-mil Membrane Weight in lb/ft2(kg/m2) is equal to 0.60 (2.9)

VERSIGARD (Black)
45, 60 and 75-MIL THICK REINFORCED EPDM MEMBRANE
STANDARD AND FIRE RETARDANT (FR)

The membrane is used for:

1. VersiGard Adhered Roofing Systems
2. VersiGard Mechanically Attached Roofing Systems

VERSIGARD REINFORCED MEMBRANES					
Physical Property	**Test Method**	**ASTM SPEC. (Pass)**	**Typical**		
			45-mil	**60-mil**	**75-mil**
			Standard	**FR**	**Standard**
Tolerance on Nominal Thickness, %	ASTM D 751	±10	±10	±10	±10
Weight, lb/ft² (kg/m²)			0.27 (1.3)	0.39 (1.9)	0.48 (2.3)
Thickness Over Scrim, min. in.(mm)	ASTM D 4637 Annex	0.015 (.381)	0.016 (.406)	0.020 (.508)	0.032 (0.81)
Breaking Strength, min, lbf (N)	ASTM D 751 Grab Method	90 (400)	140 (623)	140 (623)	177 (787)
Elongation, Ultimate, min, %	ASTM D 751 Grab Method	250 **	480**	480**	500**
Tear Strength, min, lbf (N)	ASTM D 751 B Tongue Tear	10 (45)	70 (311)	70 (311)	70 (311)
Brittleness Temp., max. deg. F (deg. C)*	ASTM D 2137	[-49] (-45)	[-49] (-45)	[-49] (-45)	[-49] (-45)
Resistance to Heat Aging* Properties after 4 weeks @ 240°F	ASTM D 573				
Breaking Strength, min, lbf (N)	ASTM D 751	80 (355)	182 (823)	182 (823)	182 (823)
Elongation, Ultimate, min, %	ASTM D 751	200**	250**	250**	250**
Linear Dimensional Change, max, %	ASTM D 1204	±1.0	-1.0	-1.0	-1.0
Ozone Resistance* Condition after exposure to 100 pphm Ozone in air for 168 hours @ 104°F (40°C) Specimen wrapped around 3" mandrel	ASTM D 1149	No Cracks	No Cracks	No Cracks	No Cracks
Resistance to Water Absorption* After 7 days immersion @ 158°F (70°C) Change in mass, max, %	ASTM D 471	+8.0, -2.0	[+5.5**]	[+5.5**]	[+5.5**]
Factory Seam Strength, min.	Modified ASTM D 816	Membrane Rupture	Membrane Rupture	Membrane Rupture	Membrane Rupture
Resistance to Outdoor (Ultraviolet) Weathering* Xenon-Arc, total radiant exposure at .70 W/m² irradiance, 176°F (80º C) black panel temp.	ASTM D 4637 Conditions	No Cracks No Crazing @7560 kJ/m²	No Cracks No Crazing @35320 kJ/m²	No Cracks No Crazing @35320 kJ/m²	No Cracks No Crazing @35320 kJ/m²
* Not a Quality Control Test due to the time required for the test or the complexity of the test. However, all tests are run on a statistical basis to ensure overall long-term performance of the sheeting.					
** Specimens to be prepared from coating rubber compound, vulcanized in a similar method to the reinforced product.					

B. VersiWeld (TPO) Membranes

VersiWeld TPO Membrane meets or exceeds the requirements of ASTM D6878, standard specification for Thermoplastic Polyolefin Based Sheet Roofing. In addition to the physical properties listed below, refer to the VersiWeld Membrane Technical Data Bulletin for Cool Roof Rating Council (CRRC) and LEED™ radiative properties as well as U.S.E.P.A. Toxic Leachate Testing and dynamic puncture resistance.

1. **VersiWeld QA TPO (Quick Applied) Reinforced Membrane –** A nominal 60-mil reinforced TPO membrane laminated to an elastomeric Pressure-Sensitive adhesive. Available in 10' width and 100' lengths.

2. **VersiWeld 45, 60-mil or 80-mil thick Reinforced Thermoplastic Polyolefin** (TPO) membrane conforms to the following physical properties. Field membrane sheets are available in rolls 12', 10' or 8' wide by 100' long. Perimeter membrane sheets are available in widths of 6' and 5' (used with 12' and 10' wide field sheets) or 4' (used with 8' wide field sheets) by 100' long. Available in white, gray or tan.

PHYSICAL PROPERTY	ASTM D6878 Requirement	45-mil Std & HS	60-mil Std & HS	60-mil QA TPO	80-mil
Tolerance on nominal thickness, % ASTM D751 test method	+15, -10	± 10	± 10	± 10	± 10
Thickness over scrim, in. (mm) ASTM D6878 optical method, average of 3 areas	0.012 min. (0.305)	0.018 typical (0.457)	0.024 typical (0.610)	0.024 typical (0.610)	0.034 typical (0.864)
Breaking strength, lbf (kN) ASTM D751 grab method	220 (976 N) min.	225 (1.0) min. 320 (1.4) typ.	250 (1.1) min. 360 (1.6) typ.	250 (1.1) min. 360 (1.6) typ.	350 (1.6) min. 425 (1.9) typ.
Elongation break of reinforcement, % ASTM D751 grab method	15 min.	15 min. 25 typ.	15 min. 25 typ.	15 min. 25 typ.	15 min. 25 typ.
Tearing strength, lbf (N) ASTM D751 proc. B 8 by 8 in.	55 (245) min.	55 (245) min. 130 (578) typ.	55 (245) min. 130 (578) typ.	55 (245) min. 130 (578) typ.	55 (245) min. 130 (578) typ.
Brittleness point, °F (°C) ASTM D2137	-40 (-40) max.	-40 (-40) max. -50 (-46) typ.	-40 (-40) max. -50 (-46) typ.	-40 (-40) max. -50 (-46) typ.	-40 (-40) max. -50 (-46) typ.
Linear dimensional change, % ASTM D1204, 6 hours at 158 °F	± 1 max.	± 1 max. -0.2 typ.	± 1 max. -0.2 typ.	± 0.5 max. -0.2 typ.	± 1 max. -0.2 typ.
Ozone resistance, no cracks 7X ASTM D1149, 100 pphm, 168 hrs	Pass	Pass	Pass	Pass	Pass
Water absorption resistance, mass % ASTM D471 top surface only 166 hours at 158 °F water	± 3.0 max.	3.0 max. 2.0 typ.	3.0 max. 2.0 typ.	4.0 max. 2.0 typ.	3.0 max. 2.0 typ.
Factory seam strength, lbf /in. (kN/m) ASTM D751 grab method	66 (290) min.	66 (290) min.	66 (290) min.	66 (290) min.	66 (290) min.
Field seam strength, lbf /in. (kN/m) ASTM D1876 tested in peel	No requirement	25 (4.4) min. 50 (8.8) typ.	25 (4.4) min. 60 (10.5) typ.	25 (4.4) min. 60 (10.5) typ.	40 (7.0) min. 70 (12.3) typ.
Water vapor permeance, Perms ASTM E96 proc. B	No requirement	0.10 max. 0.05 typ.	0.10 max. 0.05 typ.	0.10 max. 0.05 typ.	0.10 max. 0.05 typ.
Puncture resistance, lbf (kN) FTM 101C, method 2031 (see supplemental section)	No requirement	250 (1.1) min. 325 (1.4) typ.	300 (1.3) min. 350 (1.6) typ.	300 (1.3) min. 350 (1.6) typ.	400 (1.8) min. 450 (2.0) typ.
Properties after heat aging ASTM D573, 670 hrs at 240 °F Breaking strength, % retained Elongation reinf., % retained Tearing strength, % retained Weight change, %	 90 min. 90 min. 60 min. ± 1.0 max.	 90 min. 90 min. 60 min. ± 1.0 max.	 90 min. 90 min. 60 min. ± 1.0 max.	 90 min. 90 min. 60 min. ± 1.0 max.	 90 min. 90 min. 60 min. ± 1.0 max.

VERSIWELD VERSIFLEECE
100 and 115-MIL THICK TPO MEMBRANE

VersiWeld VersiFleece incorporates 45, 60 or 80-mil thick Thermoplastic Polyolefin (TPO) membrane laminated to a 55 mil non-woven fleece backing resulting in a total finished sheet thickness of 100, 115 or 135-mils. Membrane sheets are available in rolls 12' or 6' wide by 50' or 100' long. VersiWeld VersiFleece Membrane is available in white, gray or tan and conforms to the following.

Property	Test Method	Property of Unaged Sheet	Property After Aging (1) 28 days @ 240° F
Thickness of reinforced sheet over fleece, in. (mm) tolerance is ±10	ASTM D 751	0.045 (1.14) – VF 100 0.060 (1.52) – VF 115 0.080 (2.03) – VF 135	
Weight, lb/sq.ft.		0.27 VF 100 0.34 VF 115 0.44 VF 135	
Breaking Strength, min, lbf (kN)	ASTM D 751 Grab Method	300 (1.3) min. VF 100 400 (1.8) min. VF 115 425 (1.9) min. VF 135	300 (1.3) min. VF 100 400 (1.8) min. VF 115 425 (1.9) min. VF 135
Elongation at break of internal fabric,%	ASTM D 751	25 typical	25 typical
Tearing Strength, min, lbf (N) 8" by 8" specimen	ASTM D 751 B Tongue Tear	55 (245) min. 130 (578) typical	55 (245) min. 130 (578) typical
Brittleness Point, °F (°C)	ASTM D 2137	-40 (-40) min. -50 (-46) typical	
Linear Dimensional Change (shrinkage), %	ASTM D 1204	+/- 1.0 max. -0.2 typical	
Ozone Resistance, 100 pphm, 168 hours	ASTM D 1149	No Cracks	No Cracks
Resistance to Water Absorption After 7 days immersion @ 158°F (70°C) Change in mass, %	ASTM D 471 (fleece removed, edges sealed)	4.0 max. 2.0 typical	
Resistance to microbial surface growth, rating (1 is very poor, 10 is no growth)	ASTM D 3274 2 yr. S. Florida	9 – 10 typical	
Field seam strength, lbf/in. (kN/m) Seam tested in peel	ASTM D1876	40 (7.0) typical VF 100 60 (10.5) typical VF 115 70 (12.3) typical VF 135	
Water vapor permeance, Perms	ASTM E 96	0.10 max. 0.05 typical	
Puncture resistance, lbf (N)	FTM 101C Method 2031	350(1.6) min. VF 100 450 (2.0) typical VF 100 400 (1.8) min. VF 115 500 (2.2) typical VF 115 425 (1.9) min. VF 135 525 (2.3) typical VF 135	350(1.6) min. VF 100 450 (2.0) typical VF 100 400 (1.8) min. VF 115 500 (2.2) typical VF 115 425 (1.9) min. VF 135 525 (2.3) typical VF 135
Puncture resistance, Joules	ASTM D5635	17.5 VF 100 22.5 VF 115 30.0 VF 135	
Resistance to xenon-arc Weathering (2) Xenon-Arc, 17,640 kJ/m^2 VF 100, 20,160 kJ/m^2 VF 115, 27,720 kJ/m^2 VF 135 total radiant exposure visual condition at 10X	ASTM G 155 0.70 W/m□ 80°C B.P.T.	No Cracks No loss of breaking or tearing strength	

(1) Aging conditions are 28 days at 240° F (116° C) equivalent to 400 days at 176° F (80° C) for breaking strength, elongation, tearing strength, linear dimensional change, ozone and puncture resistance.
(2) Approximately equivalent to 14,000 hours exposure at 0.35 W/m^2 irradiance. B.P.T. is black panel temperature.

2.03 EPDM FLASHING ACCESSORIES

A. **VersiGard (black)/VersiGard (white) Quick Applied Pipe Seals** with Quick Applied Tape on the deck flange are available for use with VersiGard/VersiGard (white) Roofing Systems**:**

1. VersiGard (black) Quick Applied Pipe Seals are available in sizes - 1/2" to 3" and 1" to 6".

2. VersiGard (white) Quick Applied Pipe Seals are available in one size - 1" to 6".

B. **VersiGard (black and white on black) Pourable Sealer Pocket** – A pre-fabricated Pourable Sealer Pocket which consists of a 2" wide plastic support strip with Factory-Applied, adhesive backed flashing; black available in 4", 6" and 8" diameters for VersiGard black EPDM. White Available in 6" diameter only for VersiGard (white on black) EPDM.

C. **VersiGard Inside/Outside Corner –** A 7" by 9" precut 60-mil thick Uncured Flashing with a 28-mil Quick Applied Tape. Available in black only.

D. **VersiGard (black or white on black) Quick Applied Curb Flashing** – A 20" wide by 50' long VersiGard Black or VersiGard White cured 60-mil thick EPDM membrane with 6" wide Quick-Applied Tape along one edge to be used to flash curbs/skylights, etc. VersiGard Pressure-Sensitive curb flashing can also be used for vapor barrier transition for below slab applications. Refer to applicable Cold Storage Detail.

E. **VersiGard Quick Applied Overlayment Strip –** A nominal 40-mil black, **semi-cured** EPDM membrane laminated to a nominal 35-mil cured, Quick Applied Tape. Available in 6" and 9" widths and 100' long and 12" width with 50' long rolls used to flash gravel stops, metal edgings and Seam Fastening Plates used for additional membrane securement.

F. **VersiGard (black or white on black) Quick Applied Cured Cover Strip –** A 6" and 9" widths and 100' long and 12" wide by 50' long VersiGard Black or VersiGard White 60-mil cured EPDM membrane laminated to a nominal 28-mil cured Quick-Applied Tape. The Cured Cover Strip is ideal for stripping in seams, flash gravel stops, metal edging and Versico Seam Fastening Plates.

G. **VersiGard (black) Quick Applied "T" Joint Covers –** A factory cut 6" X 6" uncured 60-mil thick EPDM flashing (with rounded corners) laminated to a nominal 28-mil Quick Applied Tape, used to overlay field splice intersections and to cover field splices at angle changes.

H. **VersiGard (white on black) Quick Applied Corner/T-Joint Cover** – A 7" by 9" precut 60-mil thick (white) Uncured Flashing with a 28-mil Quick-Applied Tape; used for inside and outside corners, to overlay field splice intersections, and to cover field splices at angle changes.

I. **VersiGard (black and white on black) Quick Applied Uncured Flashing –** A 6" x 100' and 9" or 12" wide by 50' long, 60-mil thick VersiGard Black or VersiGard White **uncured** EPDM Flashing laminated to a 28-mil Quick-Applied Tape used in conjunction with EPDM Primer as an option to VersiGard Black/VersiGard White Uncured Flashing. This product can also be used as a vapor barrier transition at inside and outside corners on vertical exterior insulated wall panels.

Versico's black uncured flashings are to be used in conjunction with VersiGard Black Roofing Systems and the VersiGard White uncured flashing is to be used in conjunction with VersiGard White Roofing Systems. VersiGard Black/VersiGard White Uncured Flashing is used mainly to flash inside and outside corners, pipes, scuppers and field fabricated pourable sealer pockets when the use of Versico pre-fabricated flashing accessories is not feasible.

2.04 TPO FLASHING ACCESSORIES

A. **VersiWeld Pressure-Sensitive Cover Strip –** A nominal 40-mil thick non-reinforced TPO membrane laminated to nominal 35-mil thick cured synthetic rubber pressure-sensitive adhesive used in conjunction with V-150 or Low VOC TPO Primer to strip in flat metal flanges (i.e., drip edges or rows of fasteners and plates). Available in rolls 6" wide by 100' long in colors of white, gray or tan. Not for use on projects with greater than 20 year Warranty.

B. **VersiWeld TPO Pressure-Sensitive RUSS –** A nominal 6" and 10" wide, .045" thick reinforced TPO membrane with nominal 3" wide 35-mil thick cured synthetic rubber pressure-sensitive adhesive laminated along one end on 6" wide RUSS and along both ends on 10" wide RUSS. Used in conjunction with V-150 or Low VOC Primer. 6" wide RUSS is used as a base membrane securement along walls, curbs, etc.; 10" wide RUSS is used to form perimeter sheets on Mechanically Attached Systems.

C. **VersiWeld TPO T-Joint Covers –** A 60-mil thick non-reinforced TPO flashing cut into a 4.5" diameter circle used to seal step-offs at splice intersections. Installation is mandatory on all 60 and 80-mil TPO systems and on 45-mil systems where step-offs have not been properly sealed. Packaged in boxes of 100. Available in white, tan or gray.

D. **VersiWeld Heat Weldable Walkway Rolls –** Consists of recycled VersiWeld Membrane offering superior tear, puncture and weather resistance and designed to protect VersiWeld membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to VersiWeld membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 34" wide by 50' long and are nominal 120 mils thick. Available in white only.

E. **TPO Curb Wrap Corners –** Fabricated flashings are made of 45-mil thick reinforced VersiWeld membrane designed to reduce installation time to flash a curb when compared to conventional methods. Each corner is fabricated with a 6" wide base flange and a 12" overall height. Six sizes are available to fit curbs up to 6' by 6' in size. One curb requires 4 corners for a complete installation. TPO Curb Corners are packaged in boxes of twelve. Custom sizes are available as a special order product requiring lead-time.

F. **TPO Inside/Outside Corners** - A pre-molded corner flashing available for inside and outside corners. Available in white, gray or tan; 60-mil thick.

G. **Pipe Flashings –** A pre-molded white, gray or tan pipe flashing used for pipe penetrations. Available for 3/4" – 8" diameter pipes with clamping rings included.

H. **Split Pipe Seals –** A prefabricated flashing consisting of 45-mil thick reinforced VersiWeld Membrane for pipes 1" – 6" in diameter. A split (cut) and overlapped tab are incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration. Custom sizes are available as a special order product requiring lead-time.

I. **TPO Square Tubing Wraps –** Fabricated flashings made of 45-mil thick reinforced VersiWeld membrane for square tubing. A split (cut) and overlap tab are incorporated into these parts to allow the seals to be opened and wrapped around a square penetration. Available for 3", 4", 5" and 6" diameter square tubing.

J. **Molded TPO Sealant Pockets –** A pre-fabricated, interlocking, 2-piece, injection molded, flexible pocket with a rigid polypropylene vertical wall and pre-formed deck flanges. Pockets can be adjusted from 11.5” to 7.5” in length by 6” in width by following the cutting lines molded into the pocket. Used in conjunction with Thermoplastic One-Part Pourable Sealer for waterproofing pipe clusters or other odd shaped penetrations. Available in white, gray or tan.

K. **Pre-Fabricated Sealant Pockets –** A two-piece, pre-fabricated sealant pocket that utilizes 60-mil reinforced TPO membrane and coated metal to form a rigid, oversized sealant pocket with a weldable

horizontal deck flange. Available in 12" (total volume of 1.87 gallons). Packaged 2 per carton and available in white only. This is a special order product.

L. **Sealant Pocket Extension Legs –** Designed for use with the TPO Molded Sealant Pocket and the Pre-Fabricated Sealant Pocket to extend the length in increments of 10". Fabricated from 45-mil thick reinforced TPO membrane and TPO coated metal. Can be used full length, cut to size for customized lengths or welded to each other for extra long applications. Packaged 10 legs per carton and available in white only.

2.05 CLEANERS, PRIMERS, ADHESIVES AND SEALANTS

Refer to Technical Data Bulletins for material coverage rates and proper usage. Prior to the use of any of the products listed below, consult the Material Safety Data Sheets for applicable cautions and warnings.

A. **Versico Weathered Membrane Cleaner –** A clear, solvent-based cleaner used to loosen and remove dirt and other contaminants from the surface of exposed EPDM or TPO membrane (for repairs, etc.) prior to applying Splice Cleaner or Primer. Weathered Membrane Cleaner can also be used in lieu of splice cleaner when applying Splicing Cement. Available in 5-gallon pails.

B. **Versico V-150 Primer –** A solvent-based primer used to prepare the surface of EPDM or TPO membrane for application of Splice Tape or Pressure-Sensitive products. This Primer can also be used in conjunction with EP-95 Splicing Cement in lieu of Splice Cleaner.

C. **Versico DASH Adhesive –** A two-component (Part A and B), spray applied, low-rise adhesive for bonding VersiFleece membrane to various surfaces. DASH Adhesive can also be used as an insulation adhesive over compatible substrates. When used for membrane securement, a coverage rate of approximately 10,000 square feet per 50-gallon "drum set" or 3,000 square feet per 15-gallon drum set can be achieved.

D. **Versico DASH Adhesive Catalyst –** Added to DASH Adhesive (Part B Side) to quicken adhesive reaction time. Required when temperatures are below 50° F; recommended for temperatures between 50° and 70° F.

E. **OlyBond 500™ BA** – A two-component, polyurethane, low-rise expanding adhesive used to bond insulation to various substrates. Packaged in 5-gallon pails of Part A and Part B formulations that are applied using a mechanical dispenser system. Applied in 1/2" to 3/4" beads or ribbons at the rate of 1 gallon per 150-250 square feet for 12" o.c. bead spacing. Perimeter bead spacing patterns and acceptable insulation and deck types are listed in the applicable Technical Data Bulletin.

F. **OlyBond Spot Shot** – A two-component, polyurethane construction grade, low-rising expanding adhesive designed for bonding insulation to various substrates. Applied in 1/2" to 3/4" beads or ribbons using a portable 1:1 applicator (oversized, dual-cartridge caulking gun). Refer to the Technical Data Bulletin for bead spacing with reference to building height.

G. **Universal Single-Ply Sealant –** A 100% solids, solvent free, one-part, polyether sealant that provides a weather tight seal to a variety of building substrates. Can be used as a termination bar sealant or for use in counterflashing, coping, and scupper details. Available in white only.

H. **Water Cut-Off Mastic:** Used as a mastic to prevent moisture migration at drains, compression terminations and beneath conventional metal edging (at a coverage rate of approximately 10' per tube or 100' per gallon).

I. **EPDM CLEANERS, PRIMERS, ADHESIVES AND SEALANTS**

1. **VersiGard QA Seam Tape –** A 3" or 6" wide (used for Mechanically Attached Roofing Systems and 20-year Warranty Systems) by 100' long splice tape used for splicing adjoining sections of EPDM membrane. Complies with the South Coast Air Quality Management District Rule 1168.

2. **VersiGard (white) EPDM Peel & Stick Seam Tape –** A 3" or 6" wide by 100' long, cream-colored splice tape used with VersiGard (white) Systems. Complies with the South Coast Air Quality Management District Rule 1168.

3. **Low VOC EPDM Primer** – A low VOC (volatile organic compound) primer (less than 250 grams/liter) for use with QA Seam Tape or Quick Applied products. Available in 1 gallon pails.

4. **VersiGard Splice Adhesive (for use with VersiGard membrane systems only) –** A high-strength, butyl-based contact cement, which is used for splicing adjoining sections of EPDM membrane (cured or uncured).

5. **Versico's Lap Sealant** – A black, heavy-bodied material (trowel or gun-consistency) used to seal the exposed edges of a membrane splice. A pre-formed Lap Sealant tool is included in each carton of Lap Sealant.

   a. VersiGard Lap Sealant – Black sealant for use with VersiGard (black) Roofing Systems.

   b. VersiGard (white) Lap Sealant – White sealant for use with VersiGard (white-on-black) Roofing Systems.

6. **G200-SA Yellow Substrate Adhesive –** A high-strength, yellow colored, synthetic rubber adhesive used for bonding VersiGard/VersiGard (white) EPDM membranes to various surfaces.

7. **Low VOC Bonding Adhesive** – A low VOC (volatile organic compound) bonding adhesive (less than 250 grams/liter) used for binding VersiGard Black/VersiGard White EPDM membranes to various surfaces. Adhesive is available in 5 gallon pails.

8. **Solvent-Free EPDM Bonding Adhesive**: A solvent free, odor free, non-flammable, low VOC Bonding Adhesive used to adhere non-reinforced EPDM to multiple substrates. This one-sided application adhesive requires adhesive to be applied to substrate only, when slopes are less than 1", slopes greater than 1" or vertical substrates may require 2-sided application. When the solvent-free adhesive use is to be specified, authorized contractors must review applicable product installation information listed on the appropriate Technical Data Bulletin.

9. **Aqua Base 120 Bonding Adhesive** (for use in areas where volatile organic compound, VOC, regulations are in effect): A semi-pressure-sensitive water based adhesive; used as a 2-sided contact adhesive for bonding VersiGard EPDM membrane to various surfaces. Complies with the South Coast Air Quality Management District Rule 1168.

10. **G-400 Pourable Sealer –** A black, two-component, solvent-free, polyurethane based product used for tie-ins and as a sealant around hard-to-flash membrane penetrating objects such as clusters of pipes and for a daily seal when the completion of flashings and terminations cannot be completed by the end of each work day.

11. **VersiGard One-Part Pourable Sealer –** A black, one-component, moisture curing, elastomeric polyether sealant used for attaching lightning rod bases and ground cable clips to the membrane surface and as a sealant around hard-to-flash penetrations such as clusters of pipes.

I. TPO CLEANERS, PRIMERS, ADHESIVES AND SEALANTS

1. **TPO Primer:** A solvent-based primer used to prepare the surface of VersiWeld Membrane prior to application of Pressure-Sensitive Coverstrip and TPO Pressure-Sensitive RUSS.

2. **TPO Low VOC Primer:** A solvent-based, low solids primer used to prepare the surface of VersiWeld Membrane prior to application of Pressure-Sensitive Coverstrip and TPO Pressure-Sensitive RUSS. This low VOC product is ideal for use in states where environmental issues are a concern.

3. **VersiWeld Bonding Adhesive –** A high-strength, synthetic rubber adhesive used for bonding VersiWeld membrane to various surfaces. The adhesive is applied to both the membrane and the substrate at a coverage rate of approximately 60 square feet per gallon per finished surface (includes coverage on both surfaces).

4. **VersiWeld Low VOC Bonding Adhesive –** This product meets the <250 gpl VOC (volatile organic compound) content requirements of the OTC Model Rule for Single-Ply Roofing Adhesives. A high strength, solvent-based contact adhesive that allows bonding of TPO membrane to various porous and non-porous substrates. Apply at a rate of 60 ft2 per gallon finished surface. Available in 5 gallon pails. **This product does not comply with certain counties in the State of California which have additional restrictions on solvents.** See Versico's Technical Data Bulletin for a listing of the counties involved.

5. **Low VOC Bonding Adhesive 1168:** This product meets the <250 gpl VOC (volatile organic compound) content requirements of the OTC Model Rule for Single Ply Roofing Adhesives. A high strength, solvent-based contact adhesive that allows bonding of TPO membrane to various porous and non-porous substrates. Apply at a rate of 60 ft2 per gallon finished surface. Available in 5-gallon cans. **This product complies with all counties in the State of California which have additional restrictions on solvents.** See Versico's Technical Data Bulletin for a listing of the counties involved.

6. **Aqua Base 120 Bonding Adhesive** – A semi pressure-sensitive, water based adhesive used as a two-sided contact adhesive. Coverage rate is 120 square feet per gallon finished surface (applied to membrane and substrate). Refer to Spec Supplement G-09-11 "Aqua Base 120 Bonding Adhesive" for Warranty limitations and other considerations.

7. **Cut-Edge Sealant –** A white or clear colored sealant used to seal cut edges of reinforced VersiWeld membrane. A coverage rate of approximately 225 - 275 linear feet per squeeze bottle can be achieved when a 1/8" diameter bead is applied.

8. **White One-Part Pourable Sealer –** A one-part, moisture curing, elastomeric polyether sealant used to fill TPO Molded Pourable Sealant Pockets. Packaged in 4, 2-liter foil pouches inside a reusable plastic bucket. 1 pouch will fill 2 TPO Molded Pourable Sealant Pockets.

2.06 FASTENING COMPONENTS

A. **HPV Fastener –** A threaded, black epoxy electro-deposition coated (E-Coat) fastener **for insulation attachment only**. Used into steel, wood plank, minimum 15/32" thick plywood or minimum 7/16" thick oriented strand board (OSB).

B. **HPVX Fasteners –** A heavy duty #15 threaded fastener with a #3 Phillips drive used with Versico's HPVX Fastening Plate to secure Mechanically Attached Roofing Systems. It is used on minimum 22 gauge steel decks or minimum 15/32" CDX plywood decks. It is also designed to offer an optimum combination of driving performance, back-out and corrosion resistance with excellent pullout performance.

C. **HPV-XL Fastener –** An oversized diameter #21 (.315") steel threaded fastener used in conjunction with HPV-XL Plates for membrane securement into minimum 22 gauge steel or wood decks.

D. **InsulTite Fasteners –** A threaded, Phillips head fastener used with 3" diameter Versico Insulation Plates. Used for insulation attachment into steel or wood decks.

E. **Pre-Assembled InsulTite ASAP Fasteners –** Versico's InsulFast Fastener and pre-assembled 3" diameter Plastic Insulation Plate used **for insulation attachment only** on Adhered and Mechanically Attached Roofing Systems. Installed using Olympic Fastening Tools.

F. **CD-10 Concrete Fastener –** A hammer-driven, non-threaded, black epoxy electro-deposition coated (E-Coat) fastener for use with structural concrete decks rated 3,000 psi or greater.

G. **MP 14-10 Concrete Fastener –** A #14 threaded fastener with a #3 Phillips drive used for minimum 3,000 psi concrete decks.

H. **Polymer Gyptec Fastener:** A glass-filled nylon auger fastener designed for securing insulation and/or membrane to specialty decks such as cement wood fiber or gypsum.

I. **Versico Term Bar Nail-In –** A 1-1/4" long expansion anchor with threaded drive pin used for fastening VersiGard Termination Bar or Seam Fastening Plates to concrete, brick or block walls. The fastener is set by hammering the drive pin into place.

J. **HPVX Plate**: A 2-3/8" diameter metal barbed fastening plate used with Versico HPVX CD-10 or MP 14-10 Fasteners for membrane or insulation securement. This plate can be used for membrane or insulation securement on Mechanically Attached Roofing Systems.

K. **HPV-XL Plate**: A 2-3/8" diameter metal barbed fastening plate with an oversized hole for use with Versico HPV-XL Fasteners for membrane securement on Mechanically Attached Roofing Systems.

L. **Seam Fastening Plates –** A 2" diameter metal plate used for insulation attachment on Mechanically Attached Roofing Systems or membrane securement on Adhered Roofing Systems in conjunction with the appropriate Versico Fastener.

M. **Insulation Fastening Plates –** A nominal 3" diameter metal plate used for insulation attachment in conjunction with the appropriate Versico Fastener.

N. **EPDM FASTENING COMPONENTS**

1. **VersiGard Quick Applied RTS (Reinforced Termination Strip) –** A 6" or 9" wide, nominal 45-mil thick clean, cured reinforced EPDM black membrane with 3" wide Quick-Applied Tape laminated along one edge for the 6" wide RTS and along both edges for the 9" wide RTS.

    a. **6" wide Quick Applied RTS** is used horizontally or vertically at the base of walls, curbs, etc., in conjunction with 2" diameter Fastening Plates below the EPDM deck membrane for additional membrane securement (Polymer Seam Plates are required for Mechanically Attached Roofing Systems over steel decks).

    b. **9" wide Quick Applied RTS** is utilized for perimeter membrane securement on VersiGard Mechanically Attached Roofing Systems.

2. **VersiGard White Quick Applied RTS** (Reinforced Termination Strip) – A 6" wide, nominal 45-mil thick clean, cured, white reinforced EPDM membrane with 3" wide Quick-Applied Tape laminated along one edge. Used on VersiGard white Adhered Roofing Systems.

3. **Polymer Seam Plate** – A 2" diameter plastic barbed fastening plate used with Versico HPV Fasteners for membrane and Quick Applied RTS securement for Mechanically Attached Roofing Systems over steel roof decks. (Available pre-assembled.)

4. **Seam Fastening Plate** – A 2" diameter metal fastening plate used for membrane and RTS attachment on Mechanically Attached Roofing Systems over wood or structural concrete decks. Seam Fastening Plates are also used in conjunction with RTS or EPDM membrane for additional membrane securement on Adhered or Ballasted Roofing Systems. This plate may be used for insulation attachment on Mechanically Attached Roofing Systems.

O. **TPO FASTENING COMPONENTS**

1. **VersiWeld Pressure-Sensitive RUSS –** A nominal 6" and 10" wide, 45-mil thick reinforced TPO membrane with nominal 3" wide 35-mil thick cured synthetic rubber pressure-sensitive adhesive laminated along one end on 6" wide RUSS and along both ends on 10" wide RUSS. Used in conjunction with TPO or Low VOC Primer. 6" wide RUSS is used as a base membrane securement along walls, curbs, etc.; 10" wide RUSS is used to form perimeter sheets on Mechanically Attached Systems.

2.07 INSULATION/UNDERLAYMENT

VERSICO INSULATIONS						
Brand Name	**Board Size**	**Thickness**		**R-Value @40° F (5° C)**	**Minimum Compressive Strength (1)**	**Minimum Density**
		Inch	**cm**			
Versico EPS (Expanded Polystyrene) For use with Ballasted, as an underlayment with cover board or for Mechanically Attached/ Adhered Systems and as a floor insulation. Thicker, Tapered and higher density boards are available upon request.	4' X 4' (1.2 m X 1.2 m) or 4' X 8' (1.2 m X 2.4 m)	1" 1-1/2" 2" 3" 4" 5"	2.5 3.8 5 7.6 10.1 12.7	4.17 6.25 8.33 12.50 16.67 20.83	10 psi (2)	1 pcf
Insulfoam® SP (Expanded Polystyrene) For use with TPO Mechanically Attached Roofing Systems	4' X 4' (1.2 m X 1.2 m) or 4' X 8' (1.2 m X 2.4 m)	1" 1-1/2" 2" 3" 4" 5"	2.5 3.8 5 7.6 10.1 12.7	4.17 6.25 8.33 12.50 16.67 20.83	10 psi (2)	1 pcf
Versico Recovery Board (High density wood fiber with asphalt coated facer)	4' X 4' (1.2 m X 1.2 m) or 4' X 8' (1.2 m X 2.4 m)	1/2" 1"	1.3 2.5	1.23 2.46	32 psi	15.5 pcf
Polyisocyanurate MP-H (4) (Polyisocyanurate with a medium felt fiber facer) **Versico SecurShield** (Polyisocyanurate laminated to a premium, coated glass fiber mat facer) Tapered boards are available upon request.	4' X 8' (1.2 m X 2.4 m)	1" 1-1/2" 2" 2-1/2" 3" 3-1/2” 4"	2.5 3.8 5 6.4 7.6 8.9 10.1	6.00 9.00 12.10 15.30 18.50 21.7 25.00	20 psi (3)	2 pcf

Notes:

(1) Compressive strength at 10% deformation.
(2) Also available up to 60 psi.
(3) Also available up to 25 psi.
(4) R-Value based on 15 year time-weighted average Long-Term Thermal Resistance (LTTR), following standard CAN/ULC-S770, which has been adopted by PIMA (Polyisocyanurate Insulation Manufacturer’s Association) beginning January 1, 2003.

FOAMULAR® INSULATIONS (supplied by Versico)						
Brand Name	**Board Size**	**Thickness**		**R-Value @ 40° F (5° C)**	**Minimum Compressive Strength (1)**	**Minimum Density (2)**
		Inch	**cm**			
Thermapink 18 (Extruded Polystyrene)	2' X 8' (.61 m X 2.4 m) or 4' X 8' (1.2 m X 2.4 m)	1" 1-1/2" 2" 2-1/2" 3"	2.5 3.8 5 6.4 7.6	5.00 7.50 10.00 12.50 15.00	18 psi (1.05 kg/cm^2)	1.35 pcf (22 kg/cu m)
		3/4" 1"	1.9 2.5	3.75 5.00	25 psi 1.76 kg/cm^2)	
Foamular 400 (Extruded Polystyrene) For use primarily under concrete slab installations in freezer applications.	2' X 8' (.61 m X 2.4 m)	1" 1-1/2" 2" 2-1/2" 3" 3-1/2" 4"	2.5 3.8 5 6.4 7.6 8.9 10	5.00 7.50 10.00 12.50 15.00 17.50 20.00	40 psi (2.81 kg/cm^2)	1.8 pcf (29 kg/cu m)
Foamular 600 (Extruded Polystyrene) For use primarily under concrete slab installations in freezer applications.	2' X 8' (.61 m X 2.4 m)	1-1/2" 2" 2-1/2" 3"	3.8 5 6.4 7.6	7.50 10.00 12.50 15.00	60 psi (4.22 kg/cm^2)	2.2 pcf (35 kg/cu m)

Notes:
(1) Value at yield or 5% deformation (10% for Thermapink 18 and 25), whichever occurs first.
(2) The densities listed are minimum in accordance with ASTM C 578-87A.

2.08 UNDERLAYMENT/COVER BOARDS

A. **Dens-Deck and Dens-Deck Prime (supplied by Versico)** – A moisture-resistant, glass mat gypsum board used as a thermal barrier and a cover board in conjunction with the various Versico roofing systems assemblies. Available in 1/4", 1/2" and 5/8" thick and are 4’ x 4’ or 4' x 8' boards. Refer to Technical Data Bulletin for physical properties and other technical information.

B. **Securock® (supplied by Versico)** – A low permeable, water-resistant composition board used as thermal barriers and cover board in conjunction with the various Versico system assemblies. Available 1/4", 3/8", 1/2" and 5/8" thick in 4’ x 4’ or 4' x 8' boards. Refer to Technical Data Bulletin for physical properties and other technical information.

2.09 VAPOR/AIR RETARDER PRODUCTS AND ACCESSORIES

A. **Versico 725 Self Adhering Air and Vapor Barrier –** A 40-mil thick composite consisting of 35-mil self-adhering rubberized asphalt membrane laminated to an 5-mil UV resistant poly film with an anti-skid surface which is fully compatible with FAST/DASH Adhesive. 725TR can also function as a temporary roof for up to 120 days. Available in rolls 39" wide by 75' long (244 square feet).

B. **Versico CCW 702 Primer –** A single component, solvent based, high tack primer used to provide maximum adhesion between Versico 725 Air and Vapor Barrier and an approved substrate. Applied by spray or long nap roller with a coverage rating ranging from approximately 250 square feet per

gallon on smooth finishes (i.e., concrete) to 75 square feet per gallon on porous surfaces (i.e., Dens-Deck Prime gypsum board). Available in 5-gallon containers.

C. **Versico VersiGard Non-Reinforced EPDM Membrane –** A 45-mil thick cured, non-reinforced EPDM (Ethylene, Propylene, Diene Terpolymer) compounded elastomer. Available in widths up to 50’ and lengths up to 200’. Membrane conforms to ASTM D4637, Type I (non-reinforced).

D. **Versico CCW Root-Barrier** – A 16-mil membrane made from a layer of tightly woven HPDE scrim with a continuous 2-mil polymeric coating on both sides. Used in conjunction with Versico Quick Applied Seam Tape at lapped joints. The membrane is available in 12’ width and 90’ length rolls.

E. **Versico CCW MiraPLY-H** – a nominal 70-mil horizontal grade, self-adhering, blindside waterproofing membrane. The dual laminate membrane fuses a 45-mil thick, reinforced TPO sheet to a 25-mil butyl adhesive coating. Available size is in 4’ wide and 50’ long.

F. **TGM 3300 –** A butyl-based, adhesive sealant used to prevent moisture vapor migration where shown on applicable Versico Cold Storage details. Available in rolls 2", 3”, 4”, 6” and 12" wide and 50' lengths

G. **Water Cut-Off Mastic** – Used as a mastic to prevent moisture vapor migration at junctures where vapor seals are required. This product can also be used for compression terminations and beneath conventional metal edging (at a coverage rate of approximately 10' per tube or 100' per gallon).

2.10 EDGINGS AND TERMINATIONS

Products listed below can be used with any of the available Versico Roofing Systems. Refer to the applicable Versico details and installation instruction manuals for specific installation criteria.

A. **VersiTrim 200 Fascia** – A snap-on edge system consisting of a 24 gauge galvanized metal water dam and 40, 50 or 63-mil thick aluminum Kynar 500, clear and colored anodized finish or 22 or 24 gauge steel, Kynar 500 finish. The fascia is available in a variety of colors and heights varying from 5" to 12-1/2". Custom fascias and colors are available upon request. ANSI/SPRI ES-1 certified.

B. **VersiTrim 1000 Fascia –** A metal anchor bar fascia system consisting of a formed quarter hard 0.050" aluminum retainer bar, corrosion resistant fasteners and a 0.040" aluminum or 24 gauge steel snap-on fascia cover. Available in two versions, one for Fully Adhered and Mechanically Attached Roofing Systems. ANSI/SPRI ES-1 certified.

C. **VersiTrim 2000 Standard Fascia –** An anchor bar roof edge fascia system consisting of heavy .100" thick extruded aluminum bar, corrosion resistant stainless steel fasteners and snap-on fascia cover used with Fully Adhered, Mechanically Attached assemblies. Refer to installation instructions for various sizes, colors and accessories ANSI/SPRI ES-1 certified. Also available in **VersiTrim 2000 Extended Fascia** (Up to 13” Face Height) and **VersiTrim 2000 Canted Fascia**.

D. **VersiTrim 3000 Roof Edge System -** A metal anchor bar fascia system consisting of a 20 gauge steel retainer bar, corrosion resistant fasteners and a 32, 40, 50 or 63-mil thick aluminum or 24 gauge steel snap-on fascia cover. It is for use in Fully Adhered and Mechanically Attached Roofing Systems. ANSI/SPRI ES-1 certified. Also available in **VersiTrim 3000XT Roof Edge System** (Up to 13” Face Height).

E. **VersiGard Drip Edge –** Designed for use on Adhered and Mechanically Attached Roofing Systems. Includes a 22 gauge continuous 12' pre-punched 90-degree angle cleat and 12' long fascia sections. Incorporates concealed joint covers and strong 1-1/4" ring shank nails to provide long-term holding power. A selection of colors in 24 gauge steel, Kynar® 500 and 32-mil aluminum finish or Kynar 500 is available.

F. **VersiTrim One Piece Gravel Stop –** Designed for use on Adhered, Mechanically Fastened and Ballasted Roofing Systems. Includes a 22 gauge continuous 12' pre-punched 90-degree angle cleat and 12' long fascia sections. Incorporates concealed joint covers and strong 1-1/4" ring shank nails to provide long-term holding power. A selection of colors in 40, 50 or 63-mil thick Kynar 500, clear and colored anodized finish or 24 gauge steel, Kynar 500 finish. The fascia is available in a variety of colors and heights are custom fabricated to meet specific project requirements.

G. **VersiTrim One Coping –** A snap-on coping edge system consisting of a 24 gauge retainer bar (face side only), corrosion resistant fasteners and a 24 gauge or 0.040 aluminum Kynar finished coping cover. The coping cover is secured by clipping on the retainer bar and fastened on the backside with corrosion resistant fasteners (with rubber washer). Available for wall thicknesses up to 30". ANSI/SPRI ES-1 Certified.

H. **VersiWeld TPO Coated Metal (for TPO membrane installations only) –** A 24-gauge, galvanized steel sheet coated with a layer of non-reinforced VersiWeld Flashing. The sheet is cut to the appropriate width and used to fabricate metal drip edges or other roof perimeter edging profiles. VersiWeld Membrane may be heat welded directly to the coated metal. Coated metal is available in sheets 4' X 10' and comes packaged 25 sheets per pallet (also available packaged 10 sheets per pallet on a direct ship basis). Available in white, gray or tan.

I. **VersiTrim Heat-Weldable Drip Edge:** Pre-fabricated TPO-coated metal edging. Heat-weld membrane directly to edge. Available in sizes up to 8" fascia height and in colors: white, gray or tan.

J. **VersiGard Ballast Retaining Bar –** A ballast retaining perimeter securement system comprised of a slotted (4" on center) extruded mil aluminum retention bar with an integrated compression fastening strip. 1-1/2" stainless steel fasteners with Neoprene washers are provided for stable securement.

K. **Termination Bar –** A 1" wide and 98-mil thick extruded aluminum bar pre-punched 6" on center which incorporates a sealant ledge to support Lap Sealant and provide increased stability for membrane terminations.

2.11 OTHER VERSICO ACCESSORIES

A. **HP Protective Mat –** A nominal 6-ounce per square yard, black, UV resistant, polypropylene fabric for use as an underlayment for crushed stone or pavers and a puncture protection mat for various Versico Roofing Systems. Available in rolls 15' wide by 300' long.

B. **HP Splice Wipes –** Used in conjunction with Splice Cleaners or V-150 Primer to clean membrane prior to splicing or applying Lap Sealant.

C. **Hycron® Gloves –** A specially coated glove for protection of hands from irritations and stains during the use of Splice Cleaners, Primers, Splicing Cements and Bonding Adhesives.

D. **VersiWeld TPO Heat Weldable Walkway Rolls –** Consists of recycled VersiWeld Membrane offering superior tear, puncture and weather resistance and designed to protect VersiWeld membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to VersiWeld membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 30" wide by 50' long and are nominal 120 mils thick. Available in white only.

E. **Versico (White or Black) Pressure-Sensitive Molded Walkway Pads** – Versico molded walkway pads with factory applied Quick-Applied Tape are used to provide protection for areas of EPDM membrane that are exposed to regular rooftop maintenance.

F. **Versico Interlocking Rubber Pavers**, 24" x 24" x 2" thick rubber paver weighing approximately 24 pounds per unit, 6 pounds per square foot manufactured from recycled rubber, which provides a resilient, shock absorbing, weather resistant surface. Designed primarily for use as a walkway or on terrace areas

offering a unique, environmentally sound advantage over concrete pavers. Features include freeze/thaw stability, bi-directional drainage and no breakage concerns. Available in black and terra cotta.

PART III EXECUTION

3.01 GENERAL

A. Coordinate work with other trades to reduce the possibility of damage to partially completed roof sections or the below slab thermal protection system caused by construction traffic.

B. Do not proceed with installation of below slab components until the mud slab has fully cured and is suitable for placement of the vapor barrier and other insulating material.

C. Prior to commencement of the work, ensure transition details (vapor seal to insulated wall panel) can perform adequately. If necessary, a prototype should be constructed to demonstrate proper application procedures.

D. When possible on multiple level roofs, begin the work on the highest level to avoid or minimize construction traffic on completed roof sections.

E. On projects at high altitudes (6,000' and above), rapid flash off (drying) of Bonding Adhesive and Splicing Cement will occur due to low atmospheric pressure.

3.02 ROOF DECK CRITERIA

A. Proper decking shall be provided by the building owner. The building owner or its designated representative must ensure that the building structure is investigated by a registered engineer to assure its ability to withstand the total weight of the specified roofing system, as well as construction loads and live loads, in accordance with all applicable codes. The specifier must also designate the maximum allowable weight and location for material loading and storage on the roof.

B. Withdrawal resistance tests are strongly suggested to determine the suitability of a roof deck. For questionable pullouts refer to the applicable Adhered or Mechanically Fastened Roofing System specification.

C. Acceptable roof decks are structural concrete (3000 psi or greater), 1" thick wood plank or 15/32" thick CDX plywood, or steel (22 gauge or heavier). Steel decks of lesser gauge require pullouts to be evaluated and a heavier fastening density may be required.

D. On reroofing projects, core cuts should be taken and the roof must be investigated to determine if the existing components could remain and to verify the roof deck is structurally suitable to receive the roofing system.

E. Refer to Versico published specifications for other roof deck requirements dictated by the type of roof assembly to be installed.

3.03 SUBSTRATE PREPARATION

Defects in the substrate surface must be reported and documented to the specifier, general contractor and building owner for assessment. The Versico Authorized Roofing Contractor shall not proceed with installation unless defects are corrected.

A. **On retrofit - recover projects**, cut and remove wet insulation, as identified by the specifier, and fill all voids with new insulation so it is relatively flush (+/- 1/4") with the existing surface.

1. When installing this roofing system over an existing gravel surfaced built-up roof, loose gravel must be removed. Power brooming is recommended by Versico to remove the loose gravel, which may trap moisture. Any uneven areas of the substrate must be leveled to prevent insulation from bridging.

2. When installing this roofing system over an existing smooth surfaced modified bitumen, EPDM membrane shall be positioned with the length of sheets parallel to modified bitumen field splices. At end laps or other locations where EPDM splices intersect modified bitumen field seams, Quick Applied "T" Joint Covers or 6" wide Quick Applied Uncured Flashing must be applied over intersections.

B. **For all projects** (new or retrofit), the substrate must be relatively even without noticeable high spots or depressions. Accumulated water, ice or snow must be removed to prevent the absorption of moisture in the new roofing components and roofing system.

C. Prior to placement of new insulation:

1. Clear the substrate of debris and foreign material that may be harmful to the roofing system. Fill any gaps in the substrate with high-rise foam to ensure an airtight seal.

2. All boards shall be tightly butted together. Stop insulation approximately 1/2" away from walls and penetrations to allow for adequate application of expandable foam.

3. Where the steel deck flutes are perpendicular to the perimeter wall, fill the flutes 12" away from the wall with spray foam insulation.

3.04 VAPOR BARRIER/VAPOR SEAL INSTALLATION

The primary concern in the design of a low-temperature facility is the vapor retarder system, which should be as close to 100% effective as is practical. The success or failure of an insulation envelope is due entirely to the effectiveness of the vapor retarder system in preventing water vapor transmission into and through the insulation.

A. **Below Slab Vapor Barrier**

1. Ensure the cured mud slab is smooth, free of fins, sharp objects and foreign materials. Loose lay the VersiGard 45-mil non-reinforced EPDM over the mud slab overlapping adjoining sheets 3" to 6". Seal the overlaps with Versico QA Seam Tape in conjunction with V-150 Primer.

2. To form a vapor seal transition, install Quick Applied Curb Flashing forming a seal against the vapor barrier. Protect flashing from damage until insulated wall panels are ready for installation. Apply a generous amount of Water Cut-Off Mastic beneath the flashing (against the foundation wall) and above the flashing directly below the sill angle.

3. Turn curb flashing up against the insulated wall panel and apply generous beads of Water Cut-Off Mastic to ensure a continuous seal once the metal trim is installed. Fastening of metal trim shall not exceed 6" on center.

4. Install multiple layers of EPS or XPS insulation loosely laid above the vapor barrier and cover insulation with a slip-sheet of 16-mil CCW Root Barrier or 55-mil CCW MiraPly-H. Adjoining rolls of slip-sheet shall be overlapped and taped with Quick Applied Seam Tape in conjunction with V-150 Primer.

5. Temporarily protect the slip-sheet and the sub-slab insulation assembly by placing temporary weights until the concrete floor is ready to be poured.

B. **Roofing Vapor Barrier**

1. In cold storage and freezer facilities the moisture drive is generally downward where the roofing membrane serves as a vapor barrier.

2. In new construction, when working in colder temperatures, curing of concrete floors and the use of propane heaters to accelerate dehydration will cause construction-generated moisture to be driven upward into the roofing assembly due to the lack of ventilation. In this case, the use of a vapor retarder/barrier beneath the roofing insulation is strongly recommended to reduce the potential for condensation and the possible phenomenon of frozen blocks of insulation that may occur during temperature pull down.

3. If a vapor retarder is specified to safeguard against construction generated moisture, Versico 725TR Air and Vapor Barrier may be used. Follow installation criteria outlined in Paragraph 3.04.A.

C. **Vapor Seal Transition at Roof Deck**

A continuous vapor seal is essential around roof edges, parapets, roof-to-wall transitions, and directly above interior dividers/partitions separating between cold and warmer controlled environments.

1. Where applicable, ensure the insulated wall panel cap is set in Water Cut-Off Mastic and secured to the wall panel at 6" on center maximum.

2. Fill panel lows with trowel grade polyurethane sealant to achieve a level, smooth surface approximately 4" to 6" from the top of the panel.

3. Secure cured membrane flashing through the area of the panel that was leveled using generous application of Water Cut-Off Mastic and the VersiGard Termination Bar fastened to achieve constant compression against the panel.

4. The transition vapor seal can be completed by turning the cured flashing over the roofing membrane setting each layer in generous beads of Water Cut-Off Mastic as outlined in the applicable Versico detail.

5. Refer to applicable Cold Storage (CS) Details for alternative methods by which a vapor seal can be achieved.

D. **Exterior Wall Panel Corner Flashing**

Quick Applied Uncured Flashing is used in conjunction with V-150 Primer to provide a vapor seal at the corners of the insulated wall panel system beneath the exterior metal trim.

3.05 INSTALLATION OF WOOD NAILERS

A. Install wood nailers where required for edging, coping, etc.

B. For minimum requirements, follow the Factory Mutual Loss Prevention Data Bulletin 1-49 and ensure an uninterrupted vapor seal where required.

3.06 INSULATION INSTALLATION

A. Acceptable Insulation

In addition to insulations identified in individual roofing system specifications, the products listed below offer more economical options suited for multi-layer applications commonly associated with refrigerated assemblies.

1. **Adhered Roofing Systems** – The membrane may be adhered directly to Versico MP-H Polyisocyanurate or SecurShield Polyisocyanurate.

   Direct application over SecurShield Polyisocyanurate can provide greater uplift resistance eliminating the need for insulation overlayment of DensDeck or HP Recovery Board.

   Note: Refer to the Versico Code Approval Guide for fire rated assemblies using SecurShield Polyisocyanurate over wood decks.

2. **Ballasted Roofing Systems** – The membrane may be installed over Versico MP-H Polyisocyanurate or EPS Insulations.

3. **Mechanically Fastened Roofing Systems**

   a. In addition to VersiGard Polyisocyanurate, white TPO membrane can be installed directly over Versico Insulfoam SP EPS.

   b. In addition to VersiGard Polyisocyanurate, if the use of expanded polystyrene (unfaced) is specified, the insulation must be overlaid with Versico Recovery Board or DensDeck.

Note: In projects where Factory Mutual (FM) compliance is required, a thermal barrier (gypsum board) will be required under EPS insulation.

B. Insulation Thermal Efficiency

1. The R-value of insulation required varies with the temperature held in the refrigerated space and the conditions surrounding the room.

2. The thermal efficiency for refrigerated facilities of the same capacity vary widely. Many factors, including building design, indoor and outdoor temperatures, and especially the type and flow of goods expected and the daily freezing capacity, contribute to the refrigeration load.

3. Heat infiltration load varies greatly with the size of the refrigerated area, number of openings to warm areas, protection on openings, traffic through openings, and cold and warm air temperatures and humidities. Calculation should be based on experience, especially when most of the refrigeration load occurs during daytime operations.

4. The following table shows recommended R-values for different types of facilities. The range in R-values is due to variations in energy cost, insulation materials, and climatic conditions. For more exact values, consult a designer and/or insulation supplier. The required R-value shall be determined by the designer but shall not be less than that shown.

Recommended Insulation R-Values				
Type of Facility	**Temperature Range, °F**	**Thermal Resistance *R*, °F □ ft² □ h/Btu**		
		Floors	**Walls**	**Roofs**
Coolers[1]	40 to 60	10 (Perimeter insulation only)	24 to 30	30 to 36
Receiving/Shipping & Coolers	35 to 45	10 (Perimeter insulation only)	24 to 33	33 to 39
Chill Coolers[1]	25 to 35	25 to 30	25 to 30	36 to 42
Holding Freezer	0 to -20	34 to 40	42 to 48	42 to 48
Blast Freezers[2]	-20 to -40	34 to 40	48 to 52	48 to 51
Blast Freezers[2]	-40 to -50	34 to 40	48 to 52	54 to 60

Note: Because of the wide range in the cost of energy and the cost of insulation materials based on thermal performance, a recommended R-value is given as a guide in each of the respective areas of construction. For more exact values, consult a designer and/or insulation supplier.

[1] If a cooler has the possibility of being converted to a freezer in the future, the owner should consider insulating the facility with the higher R-values from the freezer section.

[2] R-values shown are for a blast freezer built within an unconditioned space.

C. **Insulation Placement and Attachment**

1. Regardless of the roofing assembly, insulation shall be installed in multiple layers with staggered joints. All boards shall be tightly butted together. Stop insulation approximately 1/2" away from walls and penetrations to allow for adequate application of expandable foam.

   Efforts shall be made so the top layer of insulation is at least 2" thick in order to reduce the number of fasteners without jeopardizing the performance of the roofing assembly.

2. Where the steel deck flutes are perpendicular to the perimeter wall, fill the flutes 12" away from the wall with spray foam insulation.

3. For Ballasted Roofing Systems, the insulation may be loose laid in accordance with the published Versico specification. If securement is needed, use either DASH Adhesive or beads of adhesive; mechanical fastening of insulation is not permitted.

4. **Adhered Roofing Systems**

   a. Mechanically fasten insulation at the corners and perimeter with 1 fastener and plate per every 2 square feet of roof area. Insulation in the field of the roof shall be fastened with 1 fastener and plate per every 4 square feet of roof area.

      Notes: A lesser fastening density may be approved depending on specific project conditions.

      FM insured projects require compliance with FM 1-29. Consult local FM office for required fastening enhancements.

   b. To reduce thermal bridging, a **full spray of DASH Adhesive** may be used to attach individual insulation layers or adhere the top layer to a mechanically fastened bottom layer.

c. As an option to the full spray, **beads of adhesive** shall be spaced 4" o.c. at the corners of the roof, 6" o.c. at the perimeter of the roof, and 12" o.c. over the field of the roof.

5. **Mechanically Fastened Roofing Systems**

Mechanically fasten insulation with 1 fastener and plate per every 4 square feet of roof area.

6. Refer to Part II for applicable products and fastening components for proper securement of insulation.

Note: The width of the roof perimeters and corners shall be 0.4 times the building height *or* 0.1 times the building's lesser plan dimension, whichever is smaller.

3.07 MEMBRANE PLACEMENT AND ATTACHMENT

A. **General**

Position membrane without stretching and allow to relax approximately 30 minutes prior to securement at angle change where applicable or attachment to the substrate.

1. **Adhered Roofing Systems** – refer to the individual Roofing System specification (EPDM or Thermoplastic (TPO), or VersiFleece) for applicable installation procedures and enhancements required for extended wind speed coverage.

2. **Ballasted Roofing Systems** – the membrane shall be loose laid and installed with acceptable ballast (stone or concrete pavers) in accordance with the American National Standards Institute, ANSI/SPRI RP-4 – 2013 (current edition) Wind Design Guide for Ballasted Single-Ply Roofing Systems.

3. **Mechanically Fastened Roofing Systems** – refer to the individual Roofing System specification (EPDM or Thermoplastic (TPO) for applicable installation procedures and enhancements required for extended wind speed coverage.

B. Details and installation procedures for any of the assemblies mentioned in this specification can be found in the Versico Application specification categorized by roofing system type.

3.08 FLASHING

A. To ensure a continuous vapor seal and reduce or eliminate condensation, all roof penetrations through the refrigerated facility (coolers/freezers) must be insulated in accordance with ASHRAE Refrigeration Handbook, chapter 13.

B. For specific flashing details, the Versico CS (Cold Storage) Details can be referenced. Step-by-step flashing procedures are also outlined in the applicable Versico roofing system specification and included with the Versico Universal Details.

C. Project details may be submitted to Versico for review to clarify flashing methods and products used prior to installation.

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This specification represents the applicable information available at the time of its publication. Owners, specifiers and Versico authorized roofing contractors should consult Versico or their Versico Independent Sales Represenatative for any information which has subsequently been made available.

Review the appropriate Versico warranty for specific warranty coverage, terms, conditions and limitations.

Cold Storage Envelope

Installation Details

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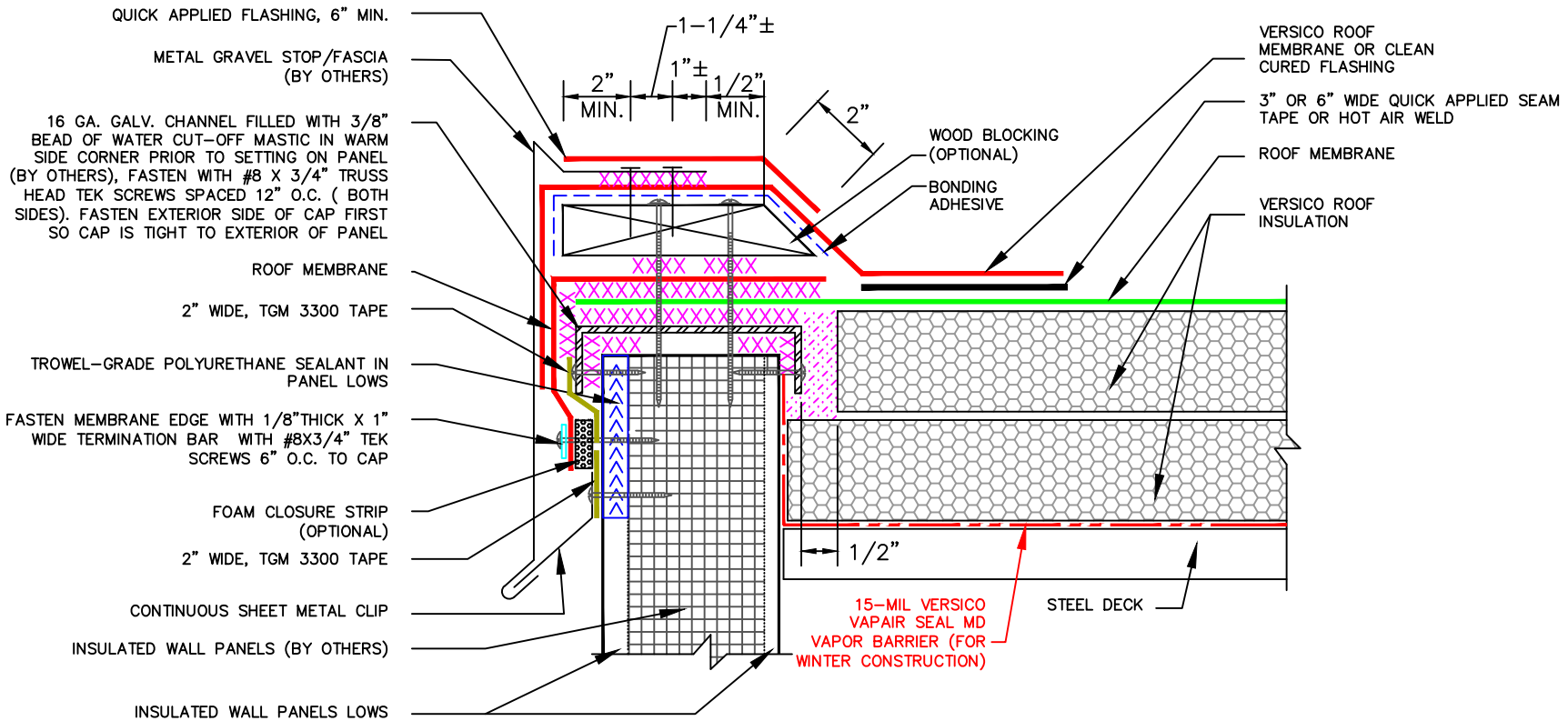
Wall Corner

Plan Detail at Wall Corner……CS 11.1.1



XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

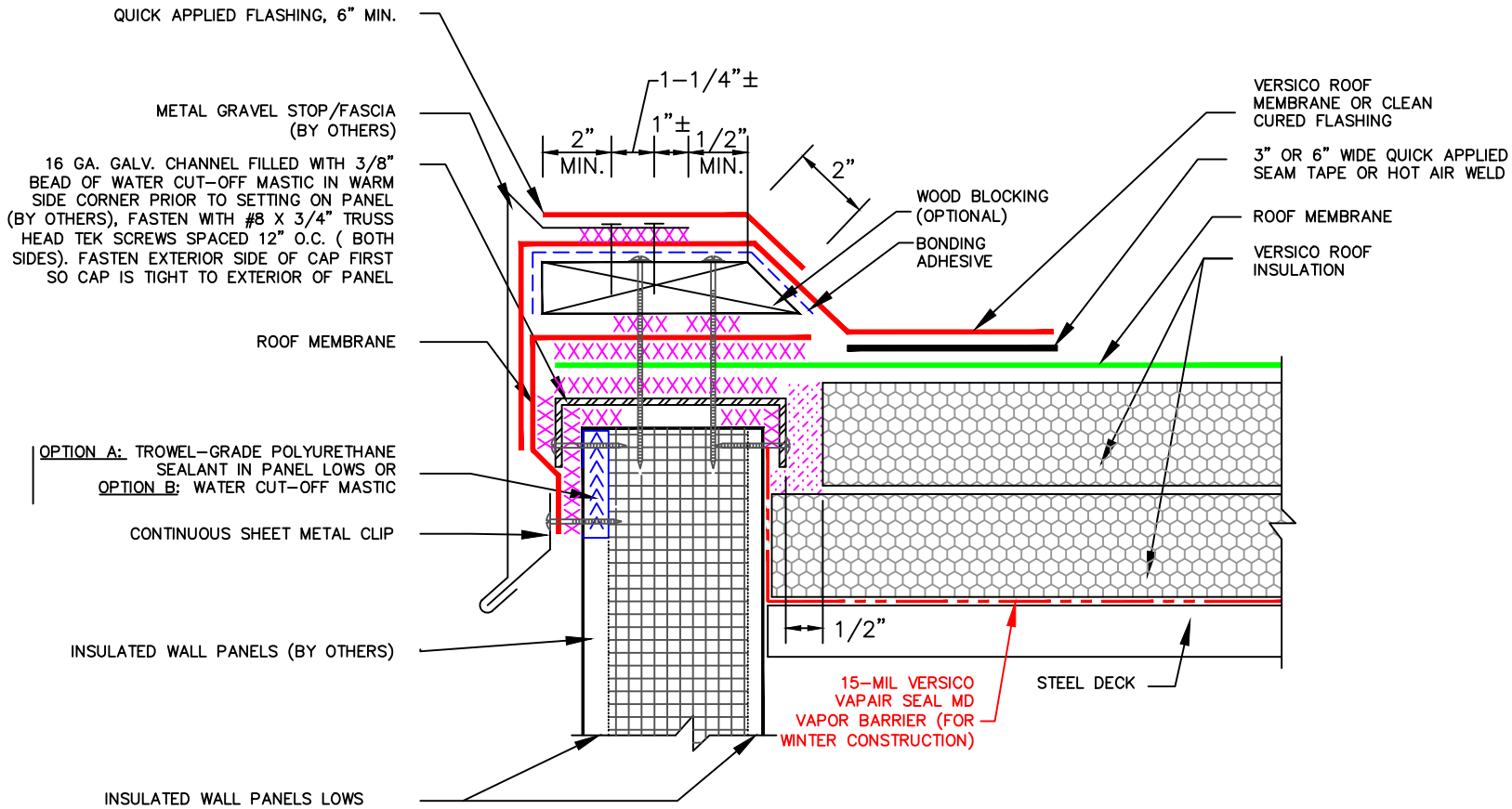
ROOF EDGE DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 1.1.1

20160401



XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

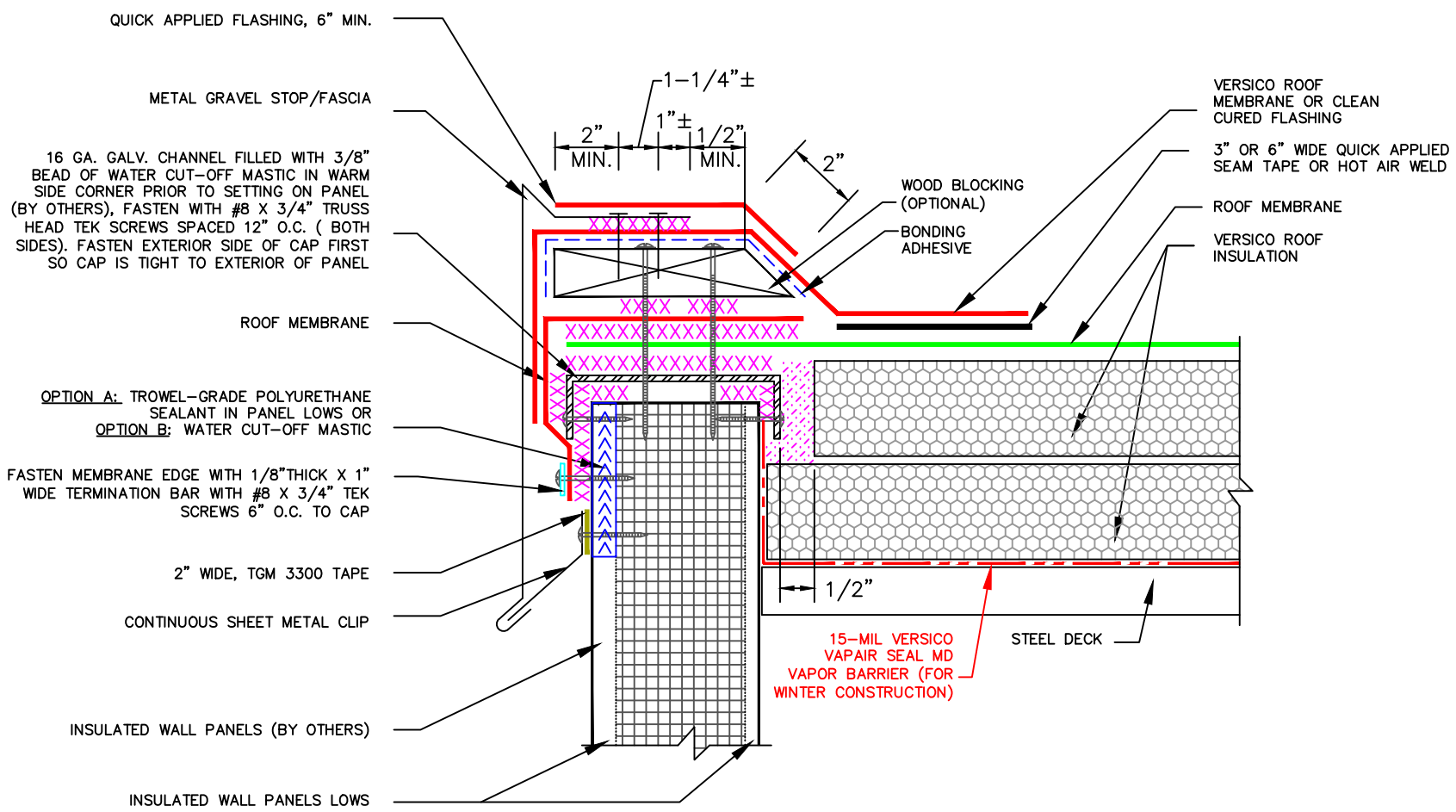
ROOF EDGE DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 1.1.2

20160401



VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

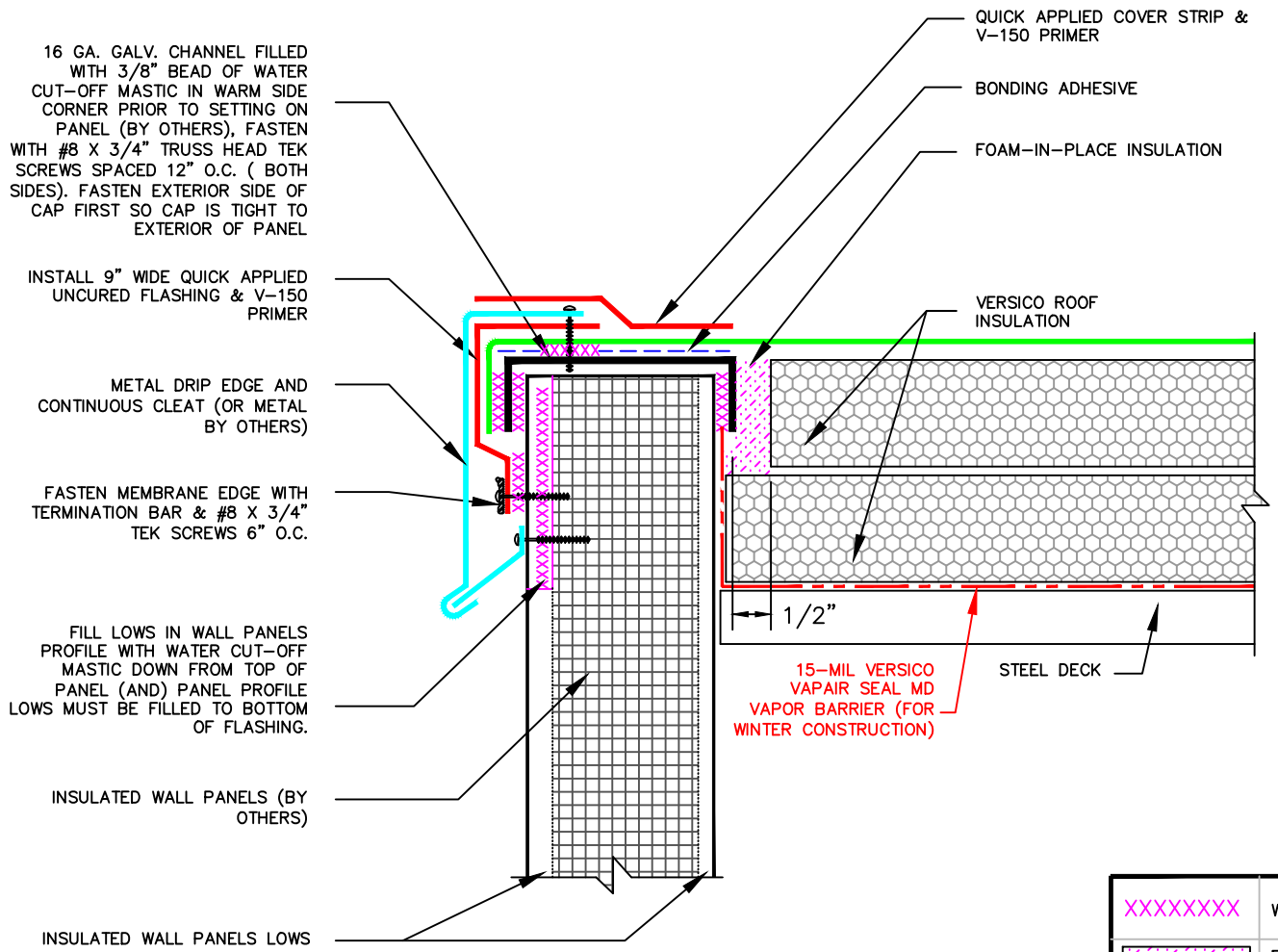
ROOF EDGE DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 1.1.3

20160401



VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

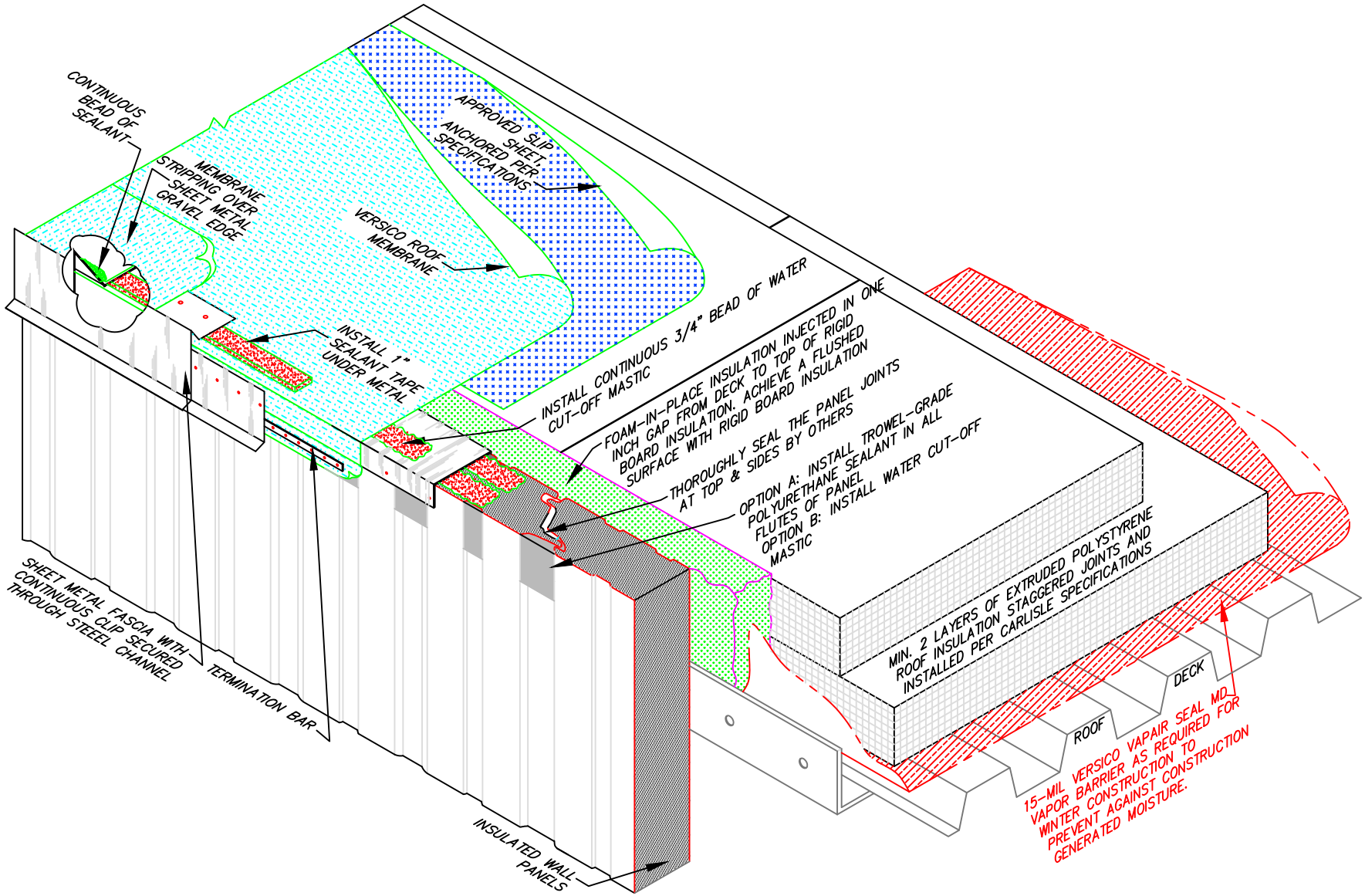
ROOF EDGE DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 1.1.4

20160401



VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

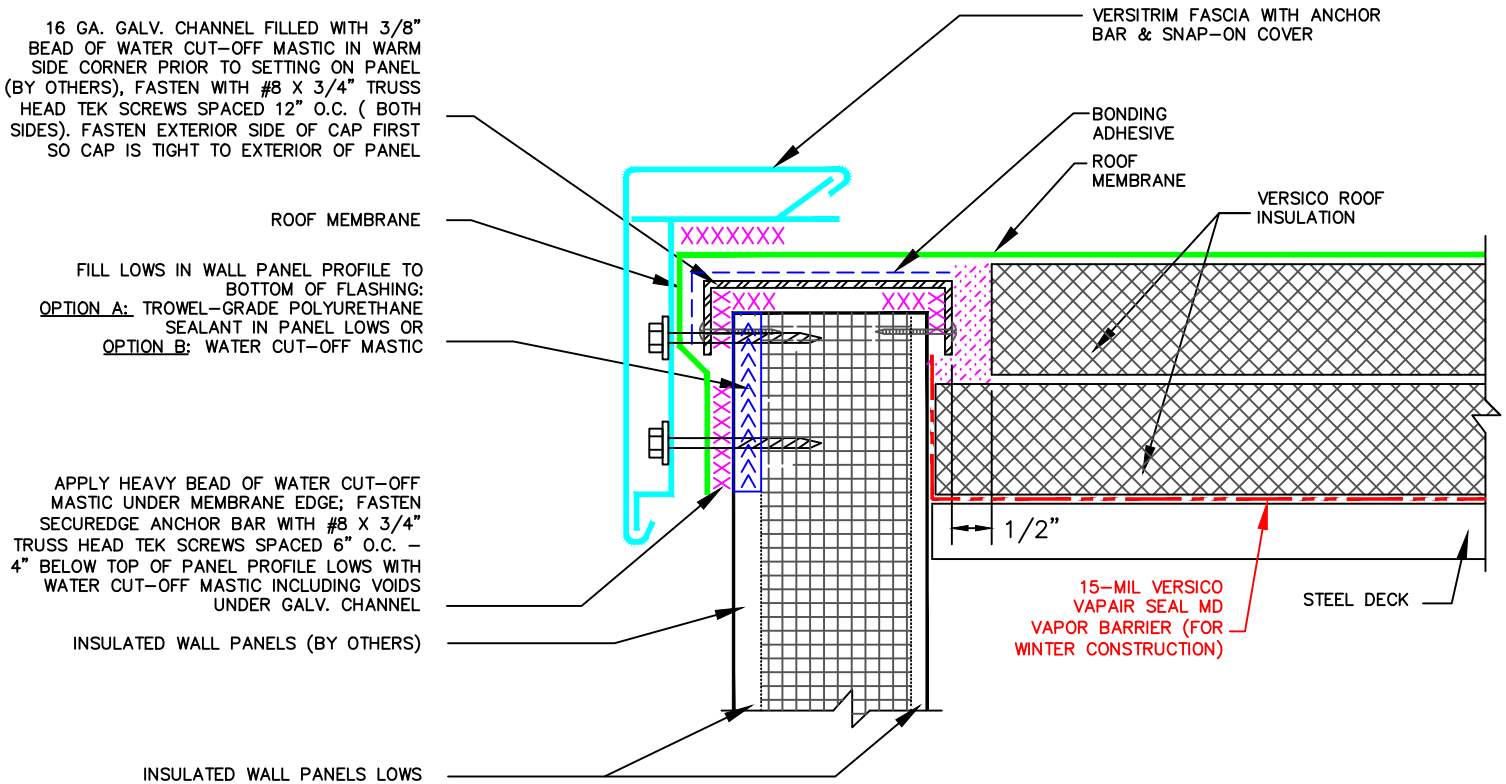
ROOF EDGE DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS | 1.1.5

20160401



XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

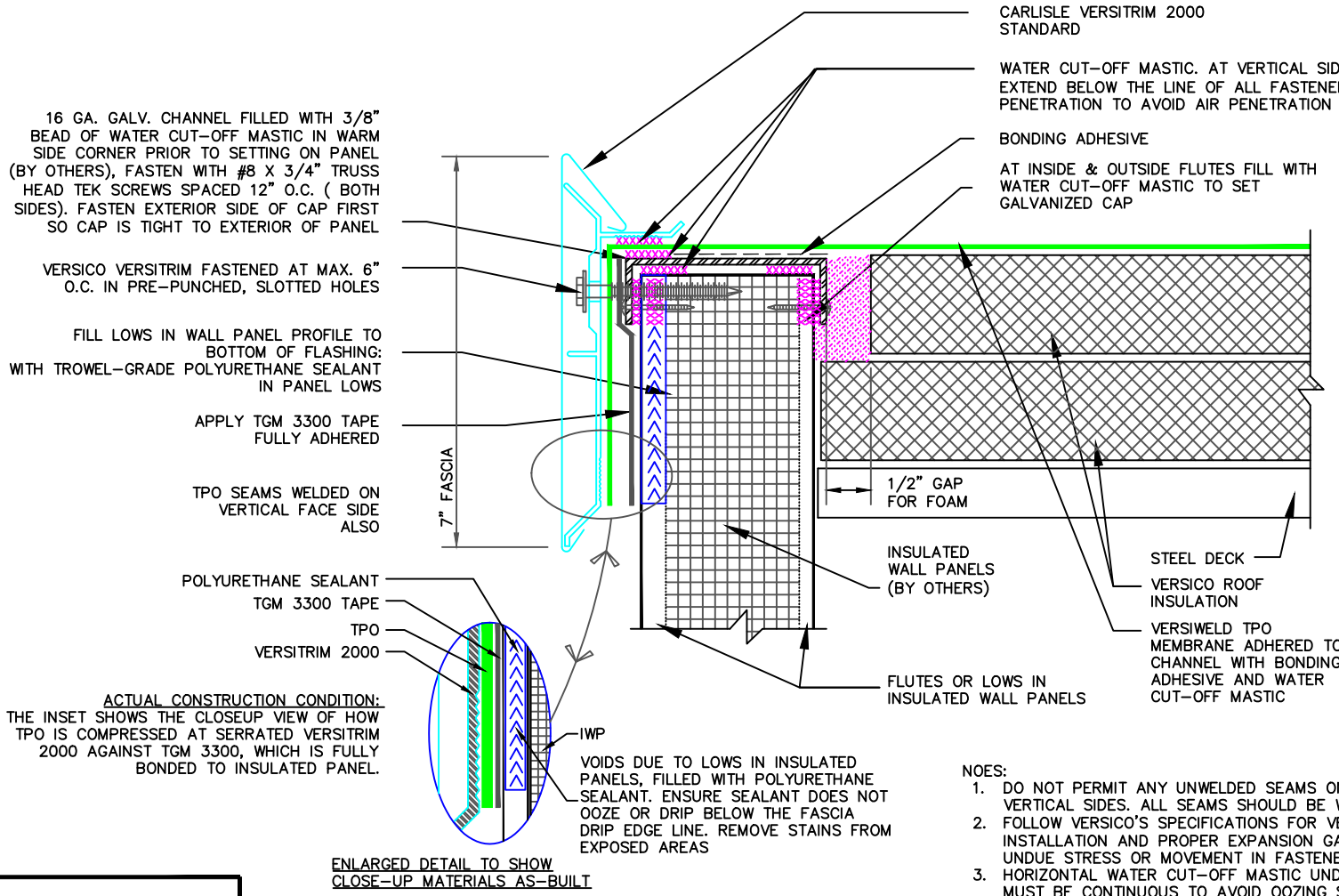
ROOF EDGE DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 1.2.1

20160401



ACTUAL CONSTRUCTION CONDITION:
THE INSET SHOWS THE CLOSEUP VIEW OF HOW TPO IS COMPRESSED AT SERRATED VERSITRIM 2000 AGAINST TGM 3300, WHICH IS FULLY BONDED TO INSULATED PANEL.

ENLARGED DETAIL TO SHOW CLOSE-UP MATERIALS AS-BUILT

NOES:
1. DO NOT PERMIT ANY UNWELDED SEAMS ON THE VERTICAL SIDES. ALL SEAMS SHOULD BE WELDED.
2. FOLLOW VERSICO'S SPECIFICATIONS FOR VERSITRIM 2000 INSTALLATION AND PROPER EXPANSION GAPS TO AVOID UNDUE STRESS OR MOVEMENT IN FASTENERS.
3. HORIZONTAL WATER CUT-OFF MASTIC UNDER VERSITRIM MUST BE CONTINUOUS TO AVOID OOZING STAINS ON THE FACADE PANELS.
4. ENSURE CHANNEL EDGE AND SPRAYED FOAM ARE FLUSH TO AVOID CORNER WEARING THE MEMBRANE HERE.
5. THE SEALANT IN PANEL'S JOINT SHOULD NOT BE SKIPPED AT TOP OF WALL BECAUSE ROOFER'S SEALANT WILL COVER THIS EDGE. IT IS STILL REQUIRED TO COMPLETELY SEAL THE ENVELOPE HERE BY PANEL INSTALLER

XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
>>>>>>>	POLYURETHANE SEALANT

VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

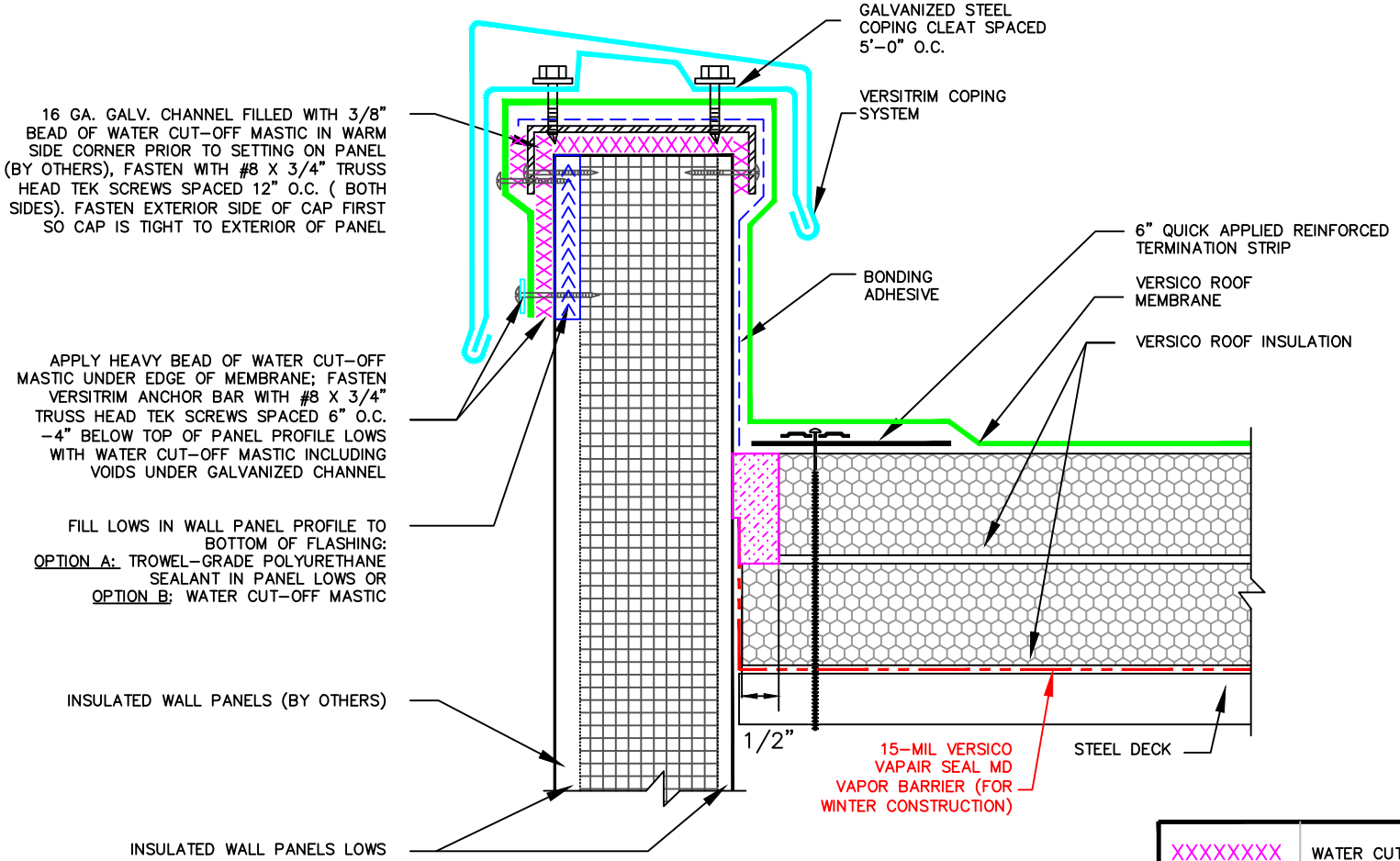
VERSICO VERSITRIM™ 2000

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 1.2.2

20160401



VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

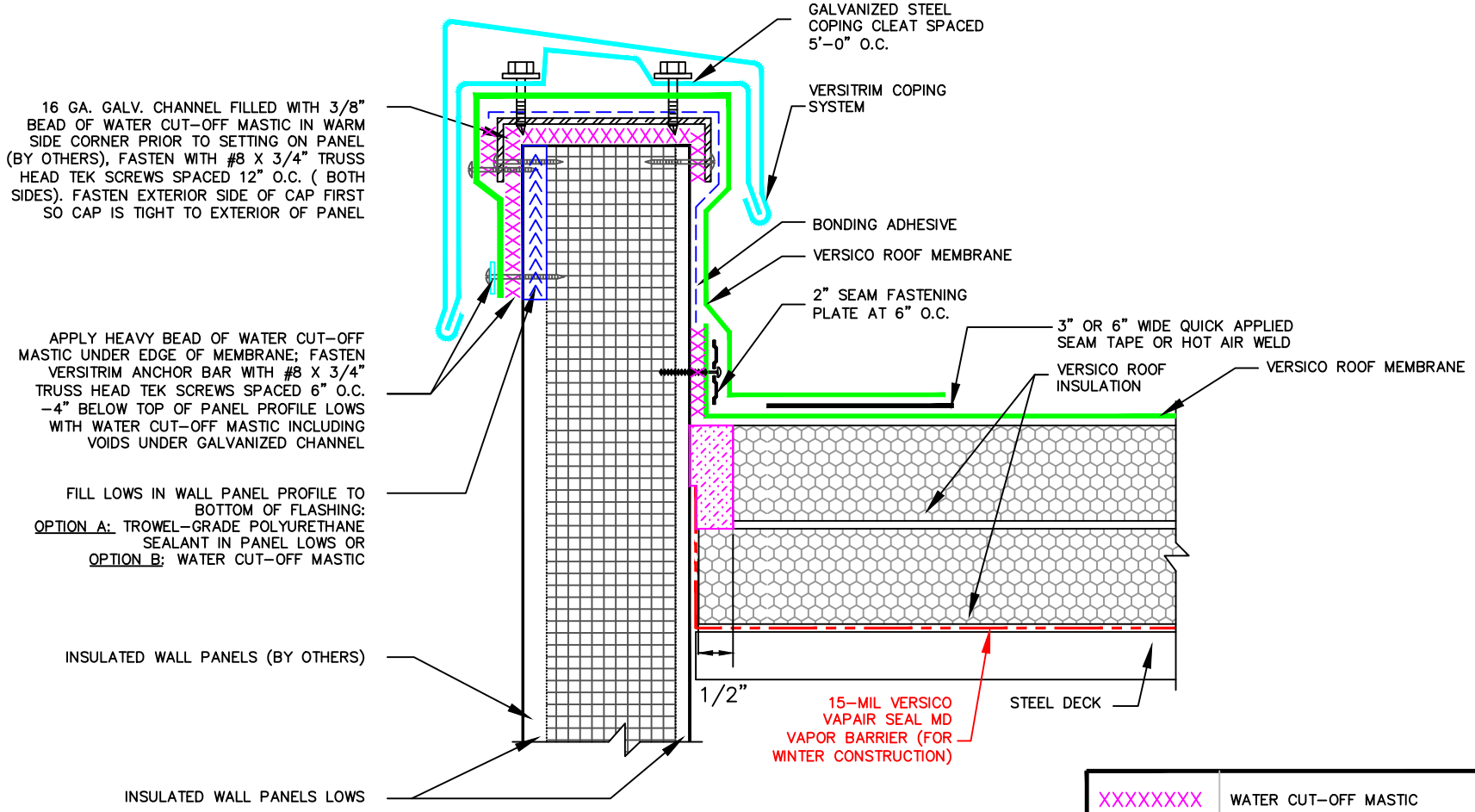
ROOF PARAPET WALL DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 2.1.1

20160401



VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

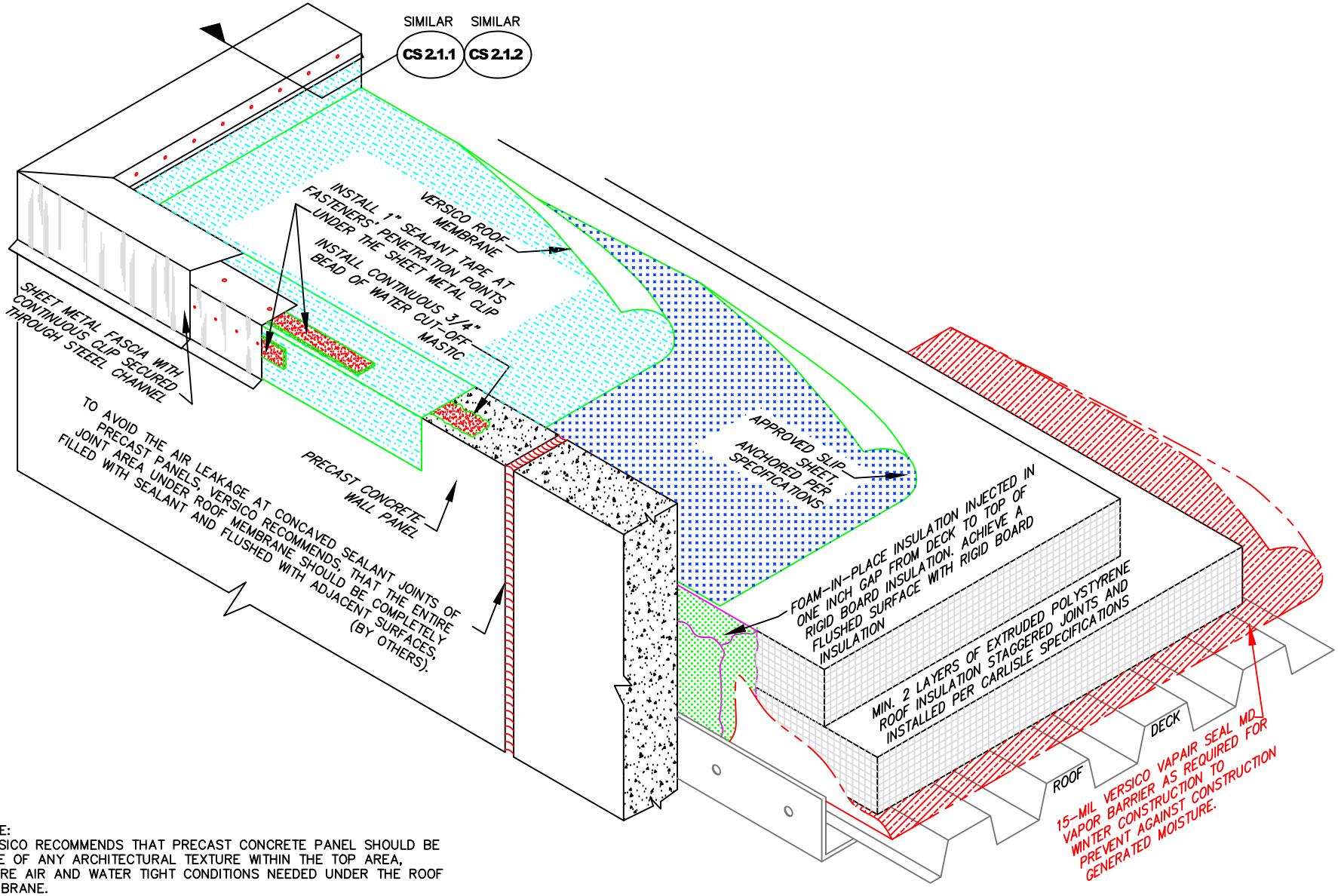
ROOF PARAPET WALL DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 2.1.2

20160401



NOTE:
VERSICO RECOMMENDS THAT PRECAST CONCRETE PANEL SHOULD BE FREE OF ANY ARCHITECTURAL TEXTURE WITHIN THE TOP AREA, WHERE AIR AND WATER TIGHT CONDITIONS NEEDED UNDER THE ROOF MEMBRANE.

VERSICO ROOFING SYSTEMS

UNIVERSAL DETAIL

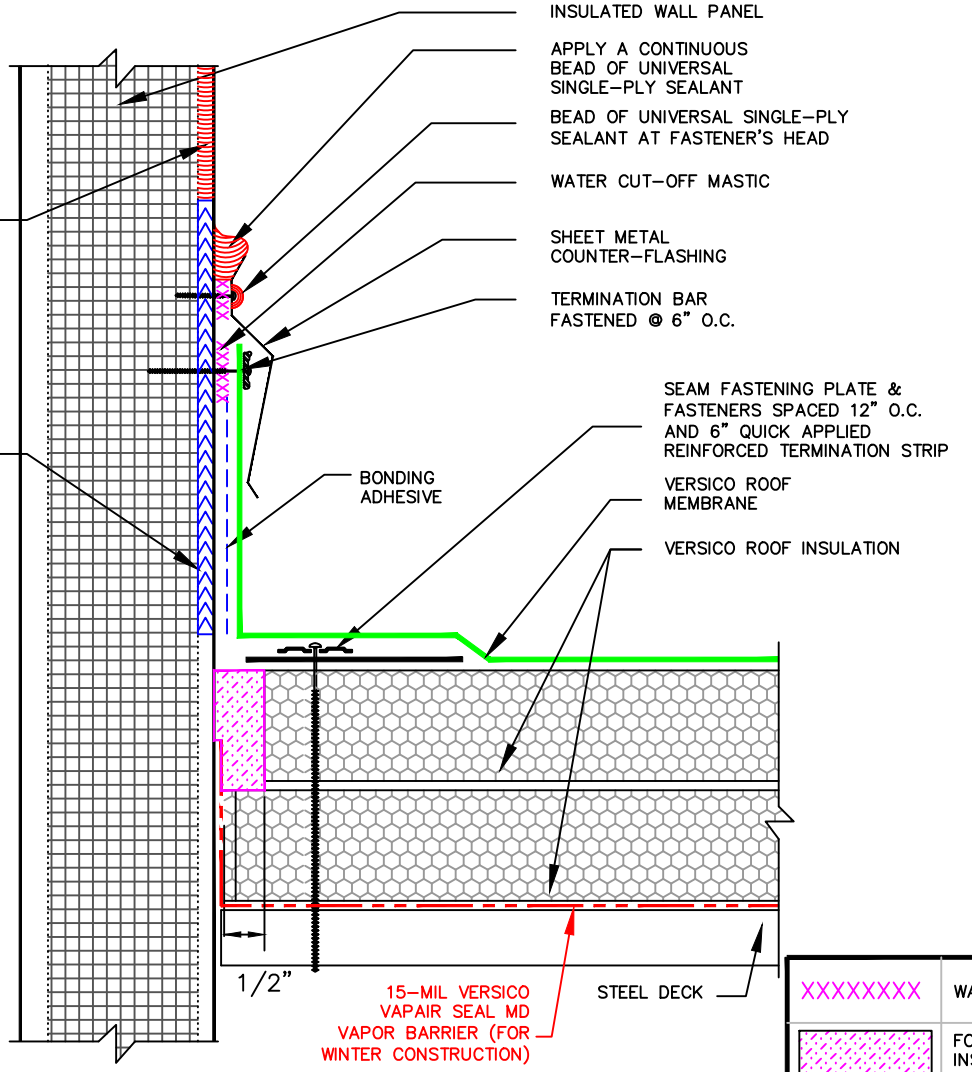
ROOF EDGE DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 2.2.1

20160401



NOTES:
1. ENSURE AIR INFILTRATION FROM OUTSIDE IS COMPLETELY RESTRICTED.
2. ENSURE THE VERTICAL JOINTS OF ALL INSULATED WALL PANELS ARE SEALED (BY OTHERS).
3. TO ACHIEVE AN AIR TIGHT CONDITION, ENSURE NO VOIDS OR AIR BUBBLES DEVELOP WHILE APPLYING SEALANT OR MASTICS.

XXXXXXXX	WATER CUT–OFF MASTIC
	FOAM–IN–PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

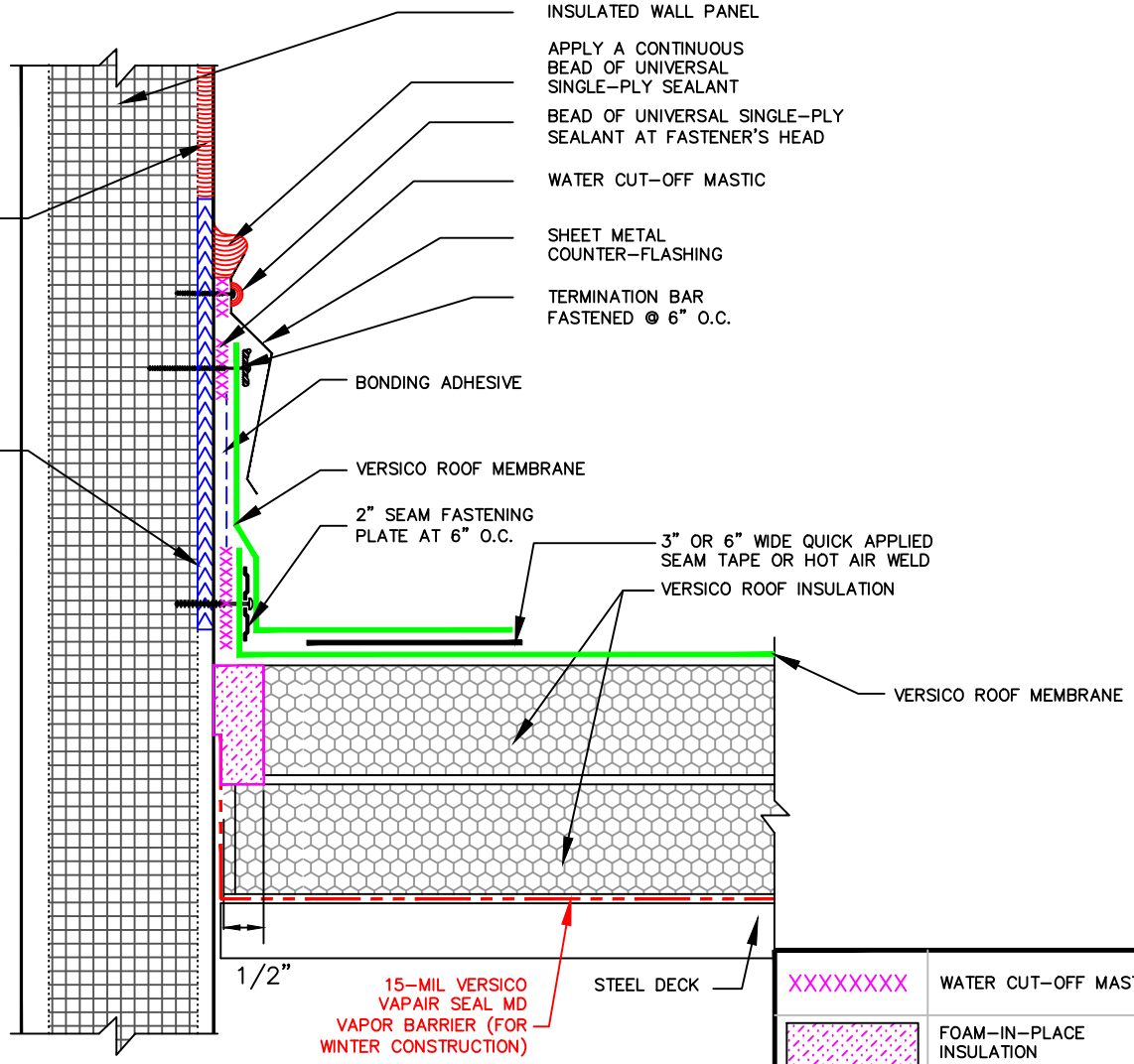
IWP: EXPOSED RISING WALL FLASHING

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 3.1.1

20160401



NOTES:

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3. TO ACHIEVE AN AIR TIGHT CONDITION, ENSURE NO VOIDS OR AIR BUBBLES DEVELOP WHILE APPLYING SEALANT OR MASTICS.

VERSICO ROOFING SYSTEMS

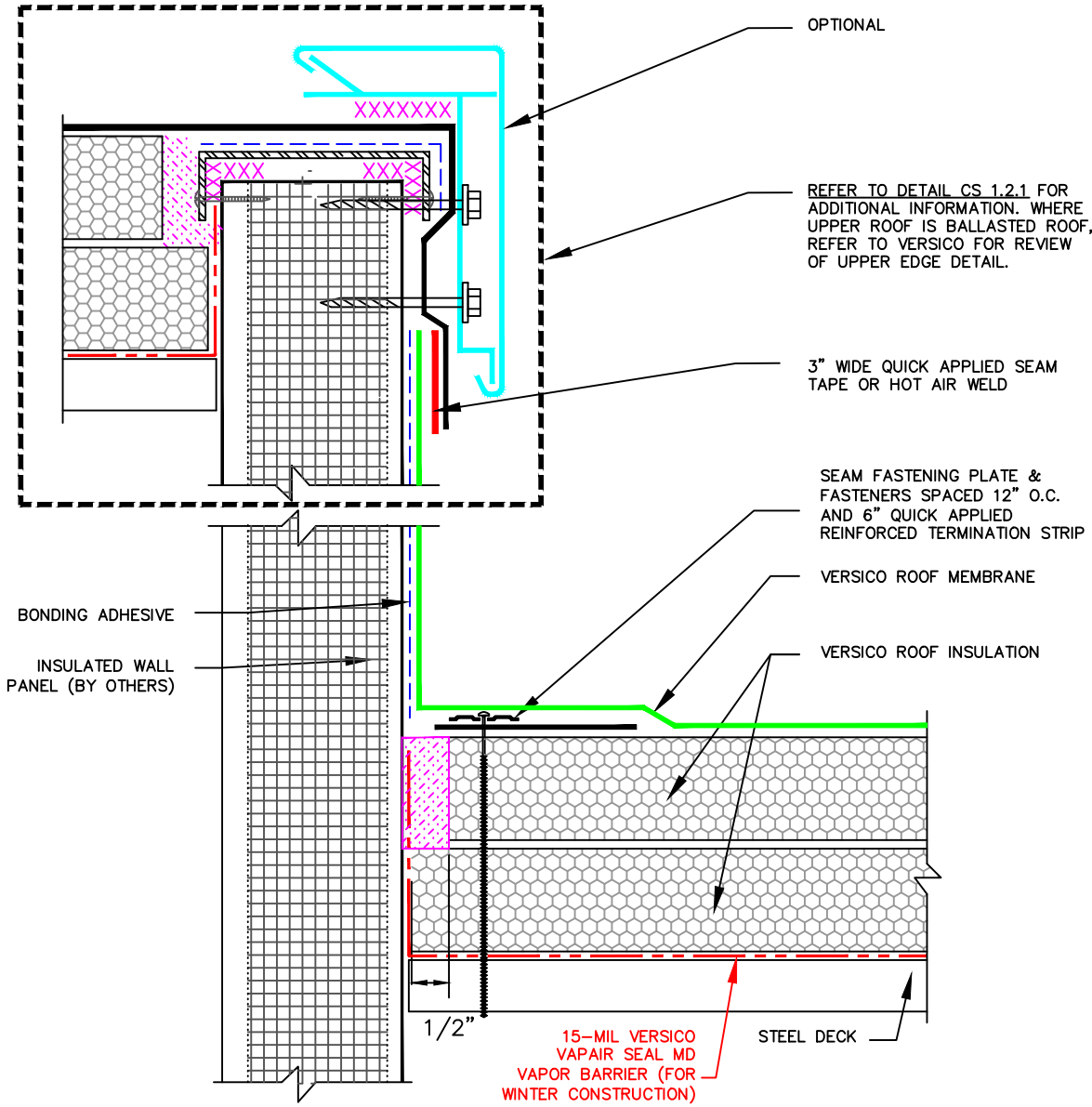
IWP: EXPOSED RISING WALL FLASHING

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 3.1.2

20160401



NOTES:
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2. ENSURE THE VERTICAL JOINTS OF ALL INSULATED WALL PANELS ARE SEALED (BY OTHERS).

XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

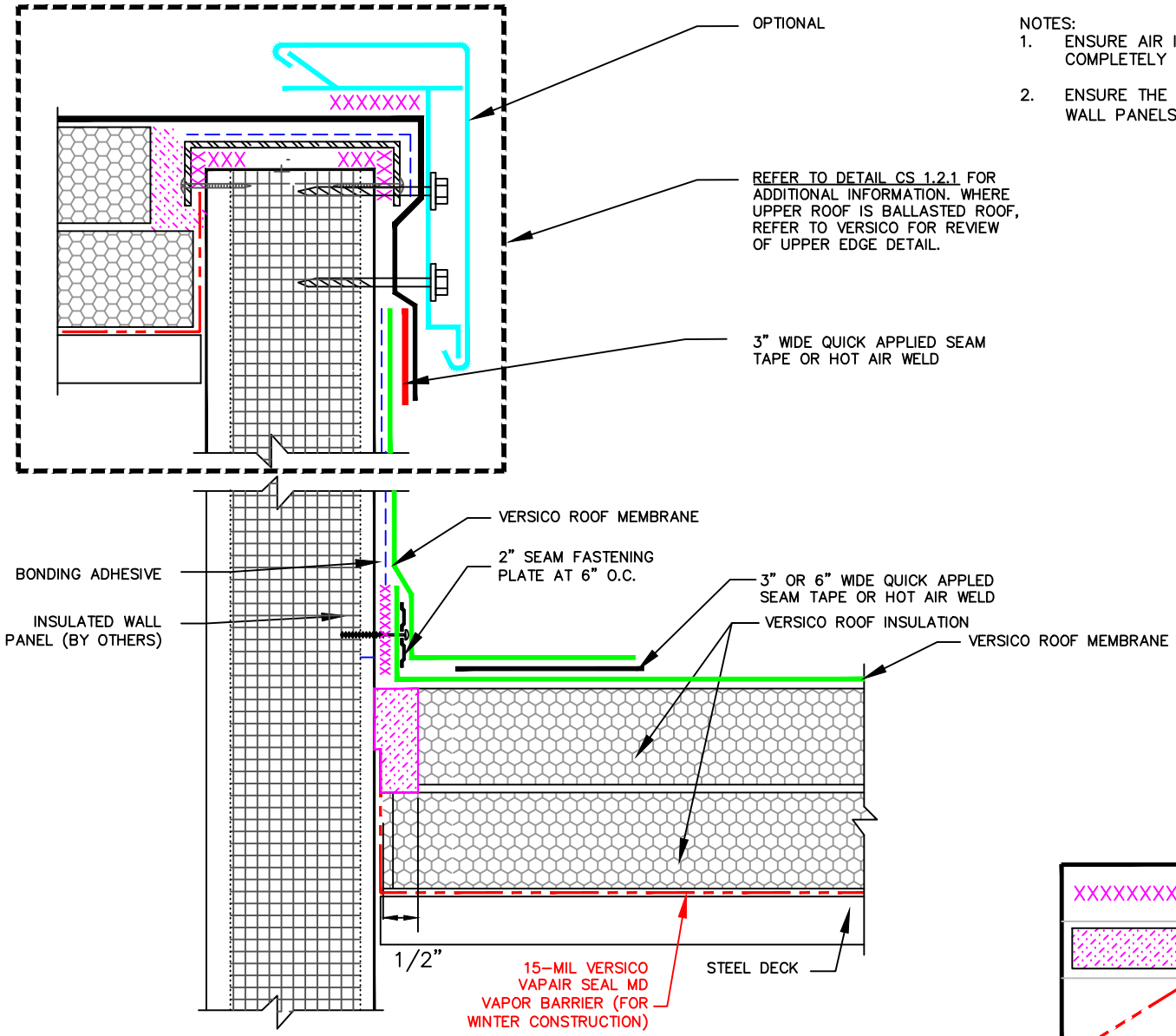
IWP: COVERED RISING WALL FLASHING

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 3.2.1

20160401



NOTES:
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2. ENSURE THE VERTICAL JOINTS OF ALL INSULATED WALL PANELS ARE SEALED (BY OTHERS).

XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

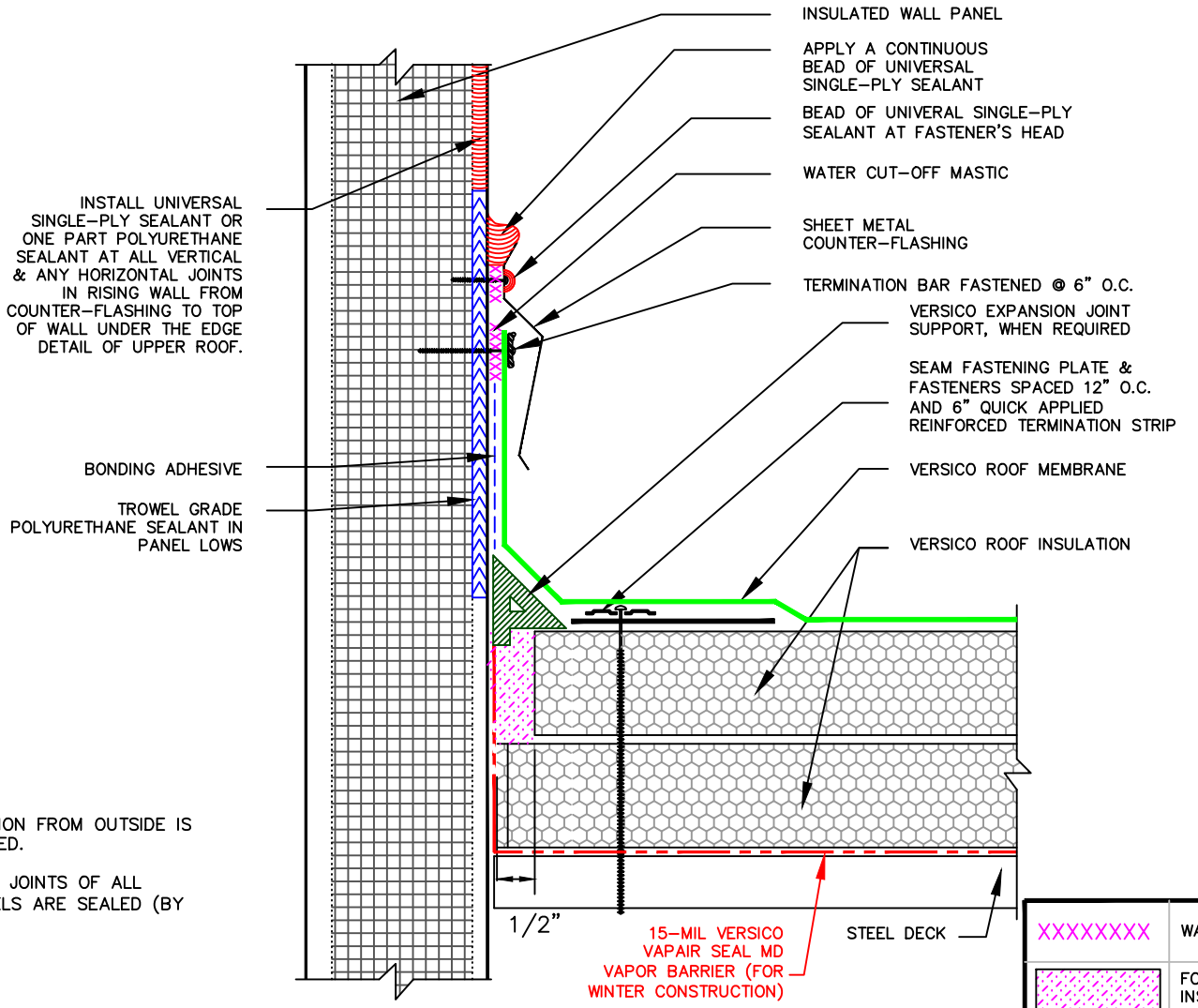
IWP: COVERED RISING WALL FLASHING

COLD STORAGE SHEET NO.

CS 3.2.2

COLD STORAGE ENVELOPE DETAILS

20160401



NOTES:
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2. ENSURE THE VERTICAL JOINTS OF ALL INSULATED WALL PANELS ARE SEALED (BY OTHERS).

XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

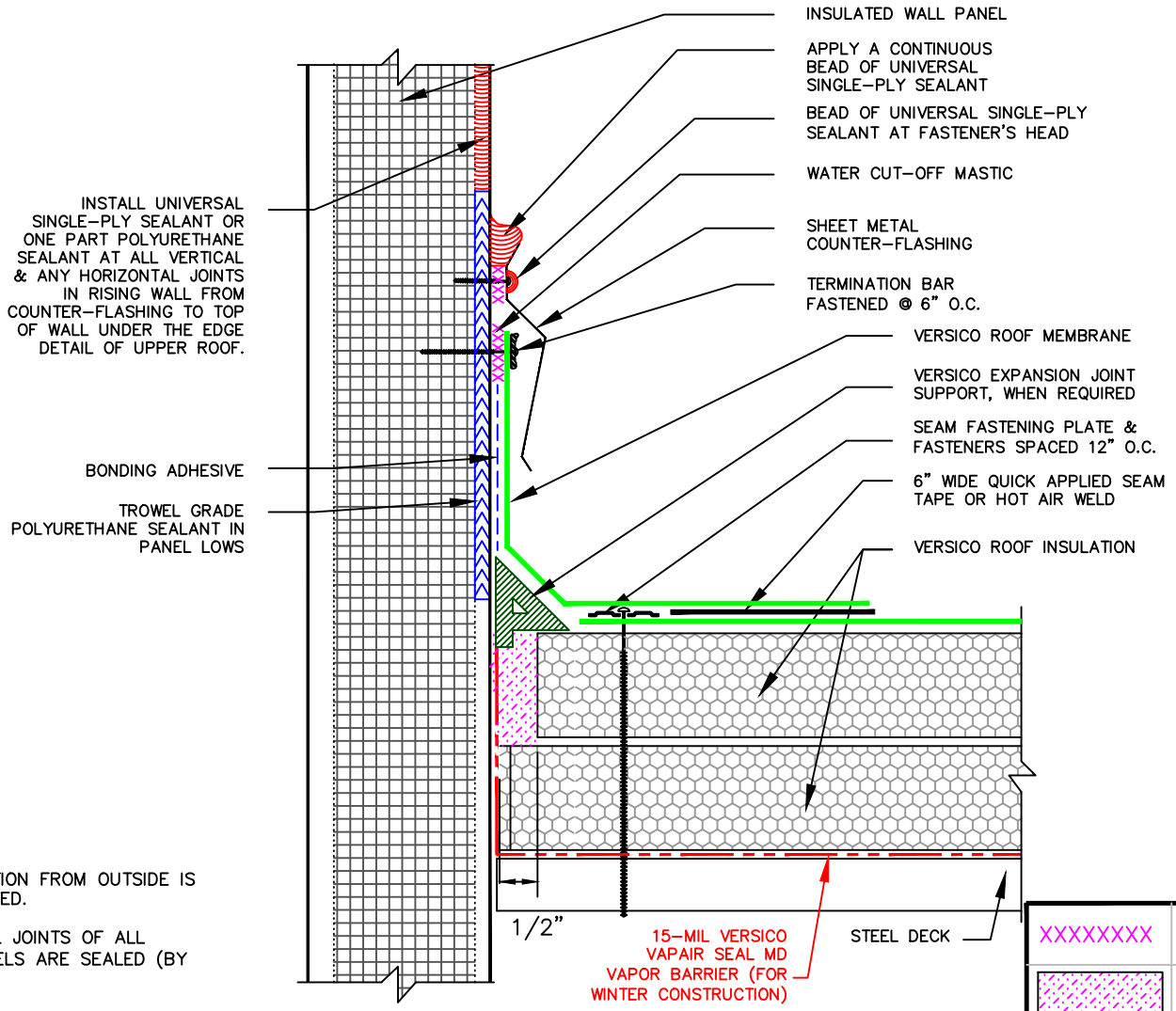
IWP: EXPOSED RISING WALL, DECK-TO-WALL EXPANSION JOINT

COLD STORAGE SHEET NO.

CS 3.3.1

COLD STORAGE ENVELOPE DETAILS

20160401



NOTES:
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2. ENSURE THE VERTICAL JOINTS OF ALL INSULATED WALL PANELS ARE SEALED (BY OTHERS).

XXXXXXXX	WATER CUT–OFF MASTIC
	FOAM–IN–PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

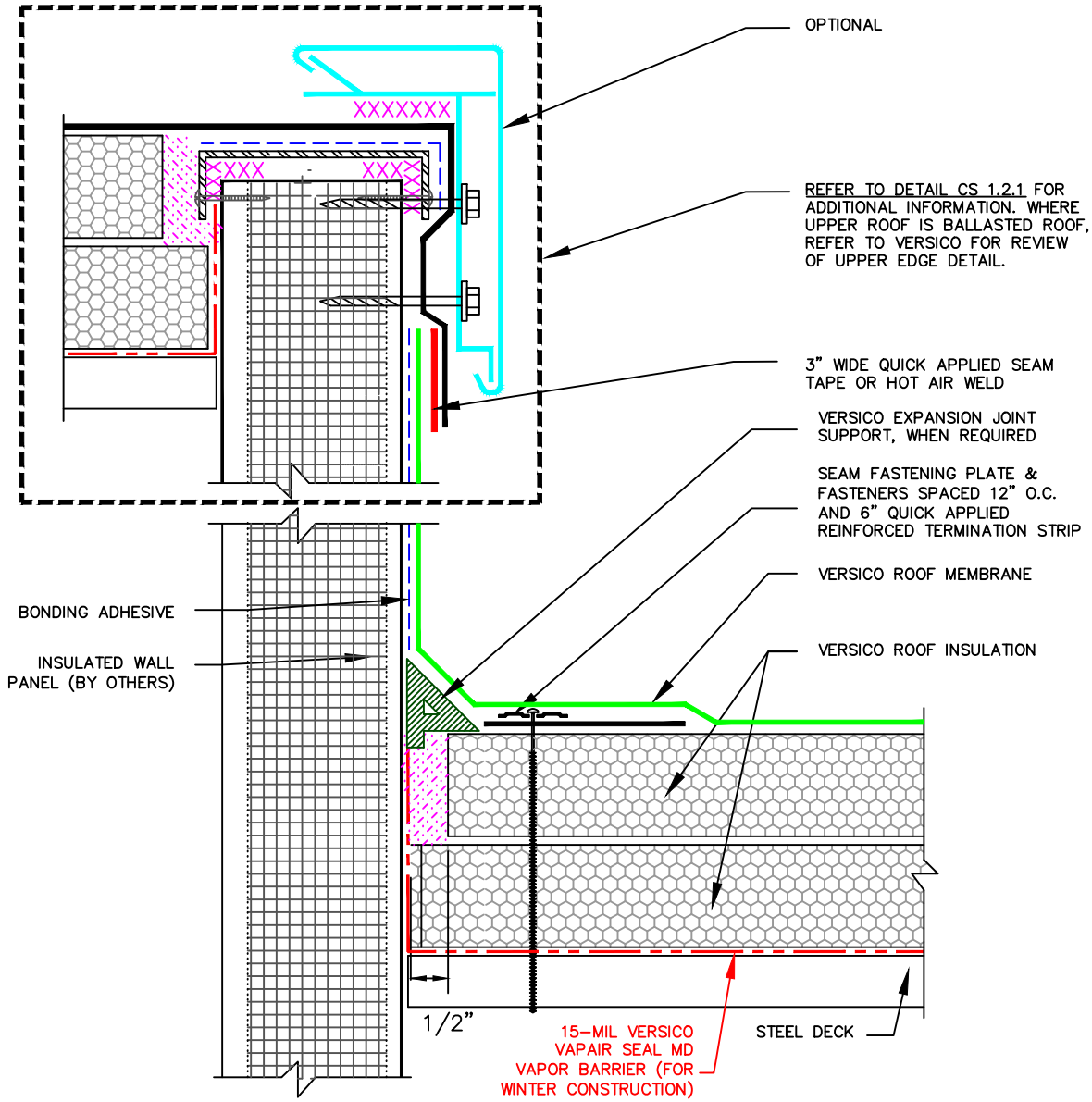
IWP: EXPOSED RISING WALL, DECK-TO-WALL EXPANSION JOINT

COLD STORAGE SHEET NO.

CS 3.3.2

COLD STORAGE ENVELOPE DETAILS

20160401



NOTES:
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2. ENSURE THE VERTICAL JOINTS OF ALL INSULATED WALL PANELS ARE SEALED (BY OTHERS).

XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

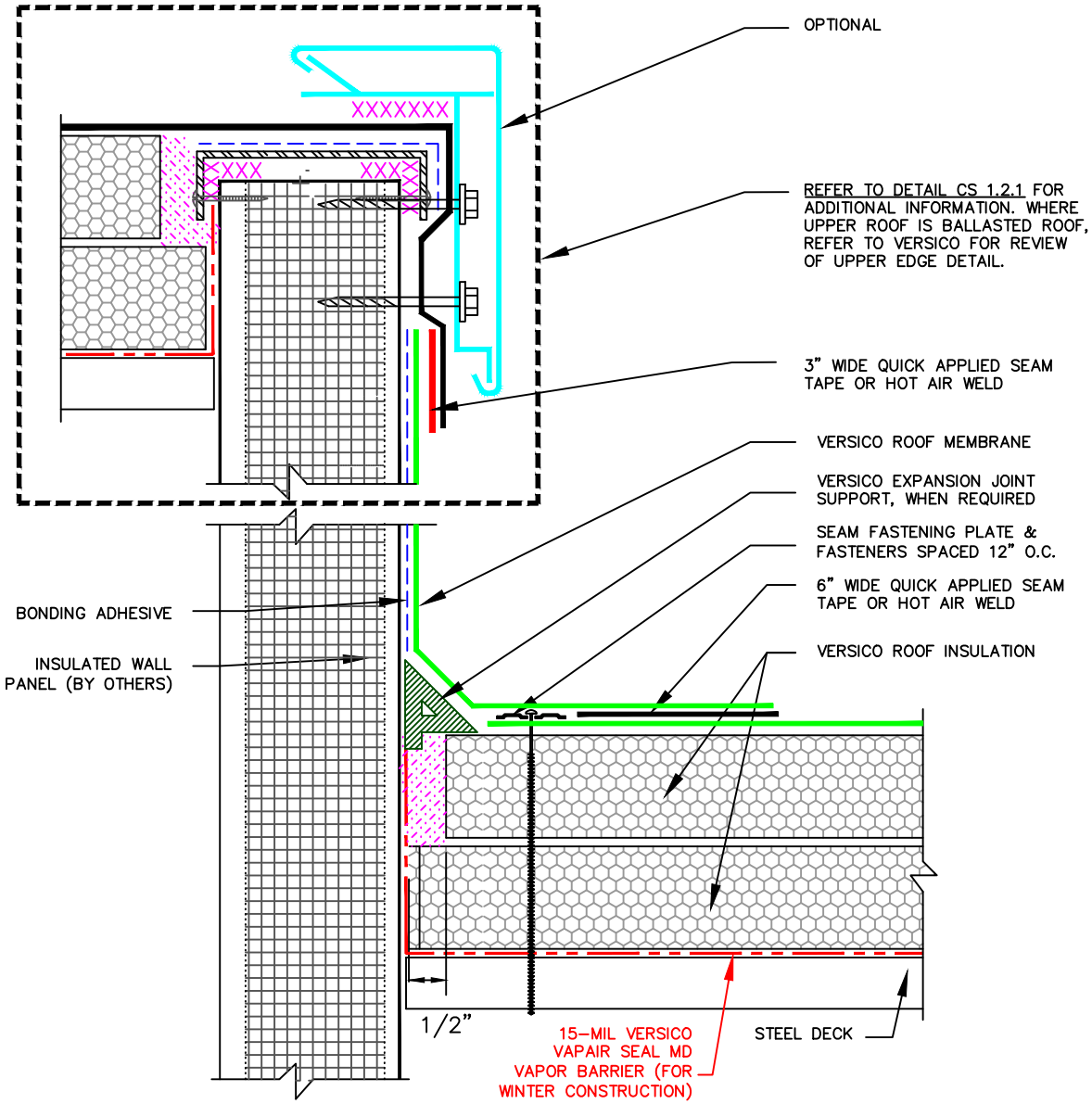
IWP: COVERED RISING WALL, DECK-TO-WALL EXPANSION JOINT

COLD STORAGE SHEET NO.

CS 3.4.1

COLD STORAGE ENVELOPE DETAILS

20160401



NOTES:
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2. ENSURE THE VERTICAL JOINTS OF ALL INSULATED WALL PANELS ARE SEALED (BY OTHERS).

XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

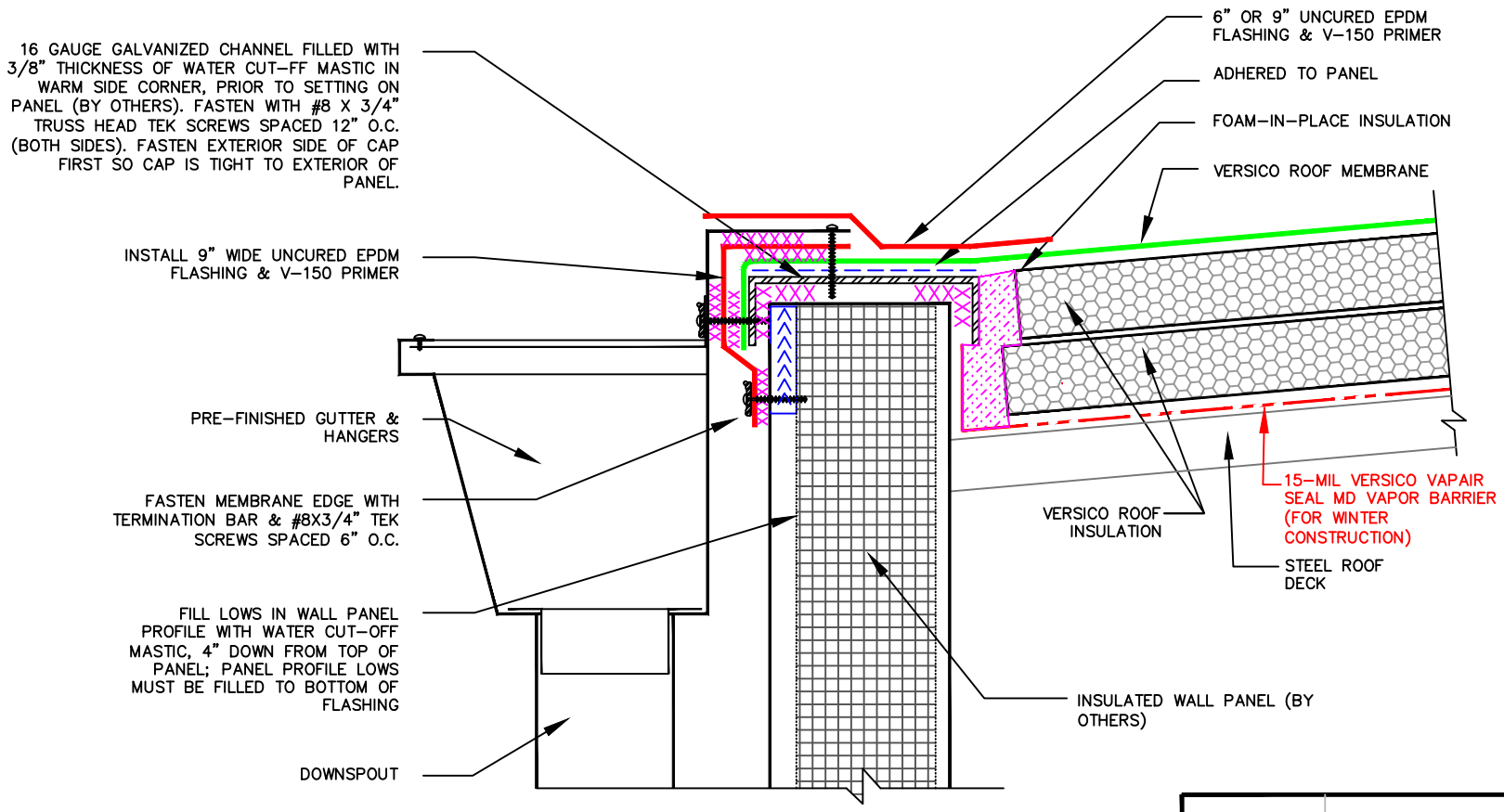
IWP: COVERED RISING WALL, DECK-TO-WALL EXPANSION JOINT

COLD STORAGE SHEET NO.

CS 3.4.2

COLD STORAGE ENVELOPE DETAILS

20160401



VERSICO ROOFING SYSTEMS

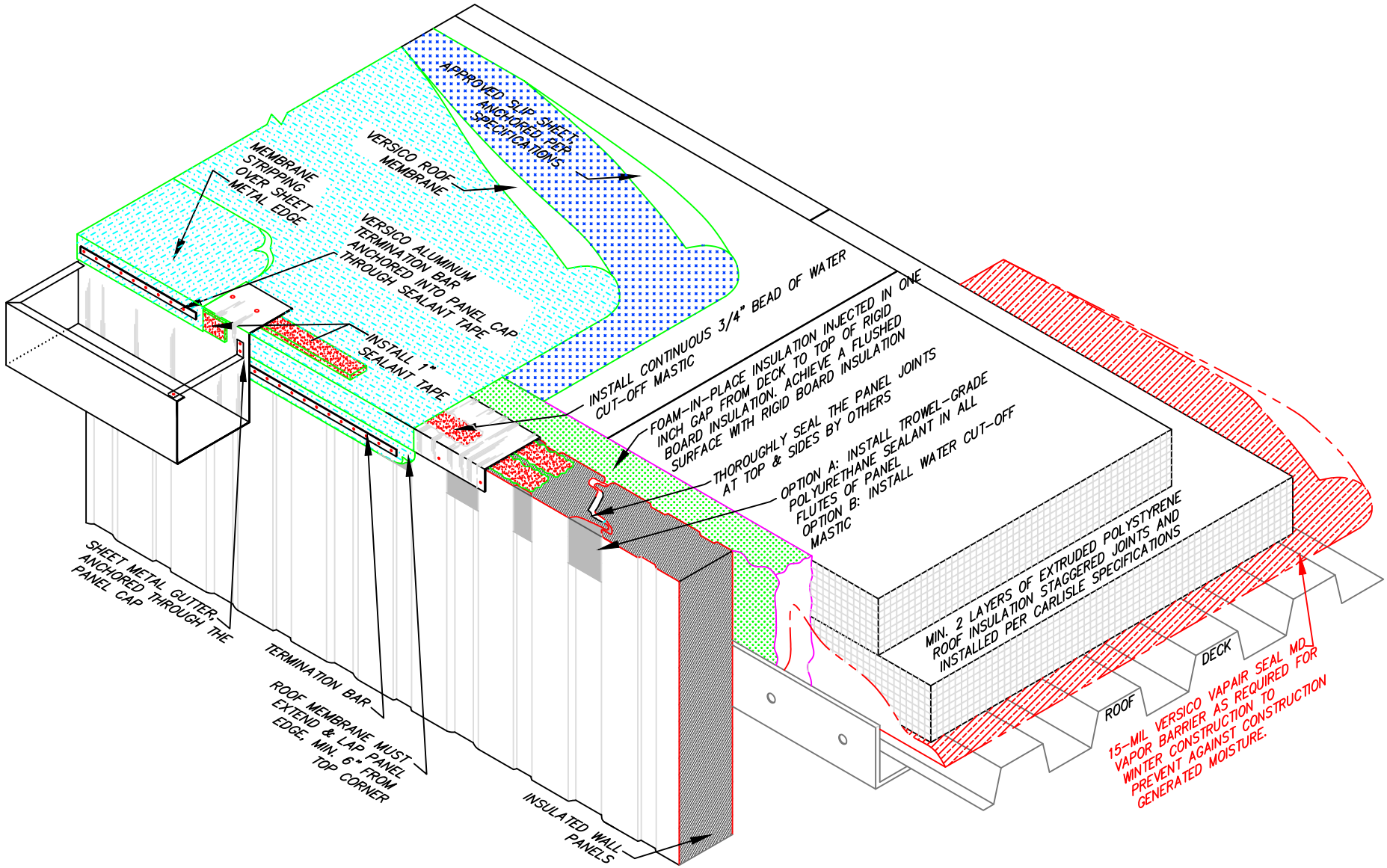
IWP: ROOF EDGE WITH GUTTER DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 4.1.1

20160401



VERSICO ROOFING SYSTEMS

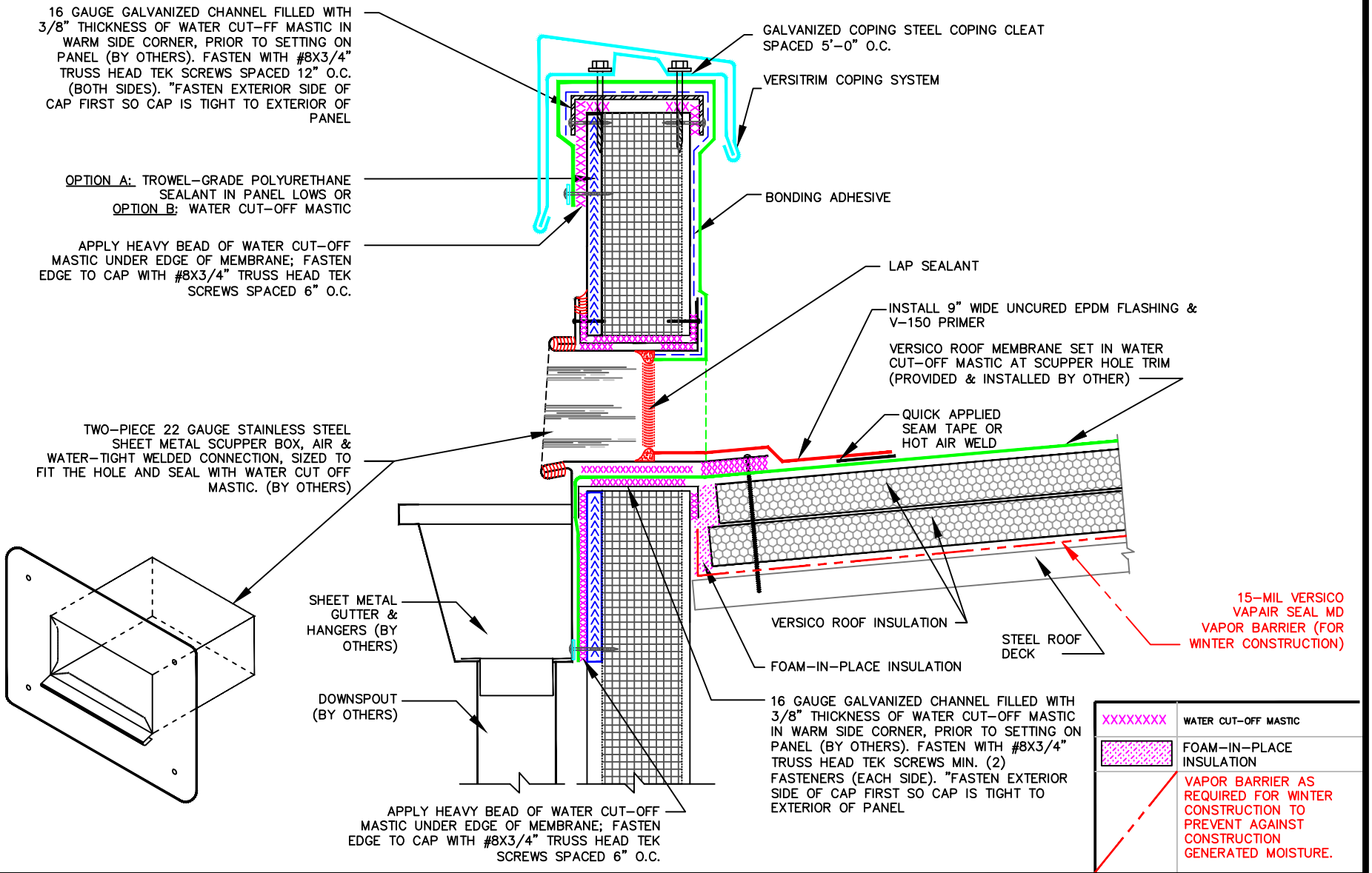
IWP: ROOF EDGE WITH GUTTER DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 4.1.2

220160401



VERSICO ROOFING SYSTEMS

IWP: THROUGH-WALL SCUPPER FLASHING DETAIL

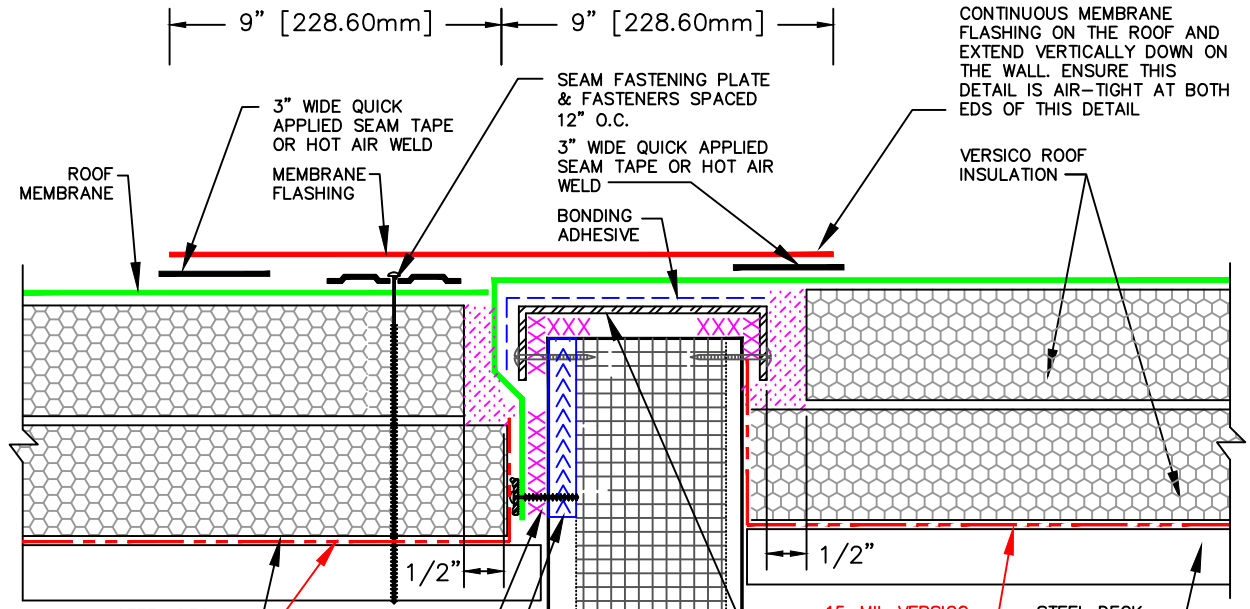
COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 4.2.1

20160401

NOTE:
PRIOR TO THIS DETAIL INSTALLATION, THE DIRECTION OF WATER FLOW SHOULD BE IDENTIFIED SO EXISTING WATER FLOW IS NOT IMPEDED.



WARM **COLD**

XXXXXXXX	WATER CUT-OFF MASTIC
	FOAM-IN-PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

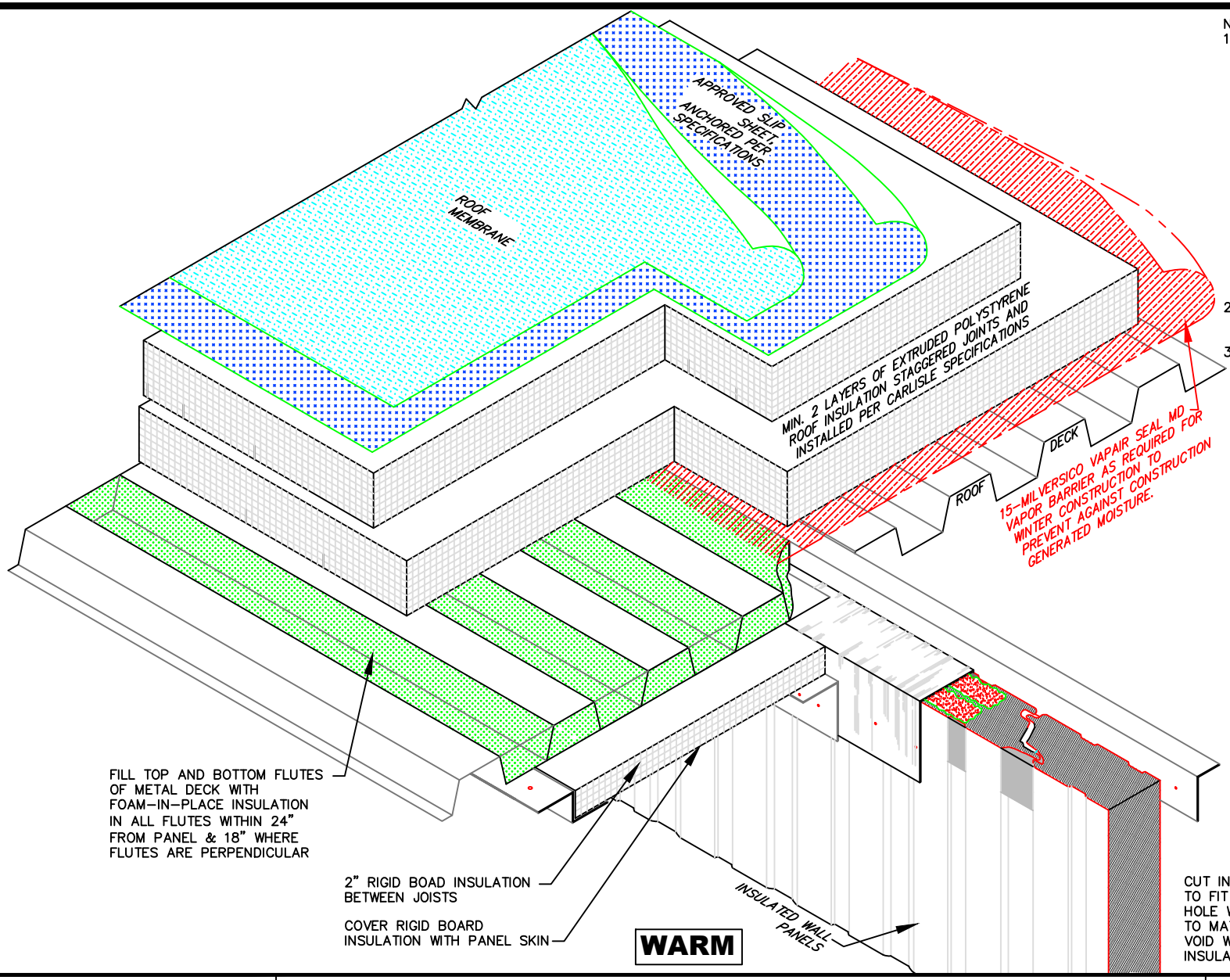
IWP: TRANSITION BETWEEN COLD & WARM SPACES

COLD STORAGE SHEET NO.

CS 5.1.1

COLD STORAGE ENVELOPE DETAILS

20160401



NOTE:

1. ROOF INSULATION SHOULD BE ISOLATED WITH MEMBRANE STRIPPING BETWEEN COLD AND WARM AREAS, TO AVOID HUMID AIR INFILTRATION THROUGH ADJACENT ROOF, GENERATED FROM WARM ROOMS OR ATMOSPHERIC HUMIDITY INFILTRATING INTO WARM SIDE ROOF – UNLESS A VAPOR RETARDER IS INSTALLED UNDER THE INSULATION OF WARM SIDE ROOMS WITH AIR-TIGHT DETAILING, AS WELL AS ROOF SYSTEM IS AIR-SEALED ALSO.
2. ABOVE MENTIONED MEMBRANE STRIPPING IS NOT SHOWN HERE.
3. COORDINATE WITH VERSICO FOR PROPER POSITIONING, DETAILING AND USE OF VAPOR RETARDER REQUIREMENTS IN THIS DETAIL.

VERSICO ROOFING SYSTEMS

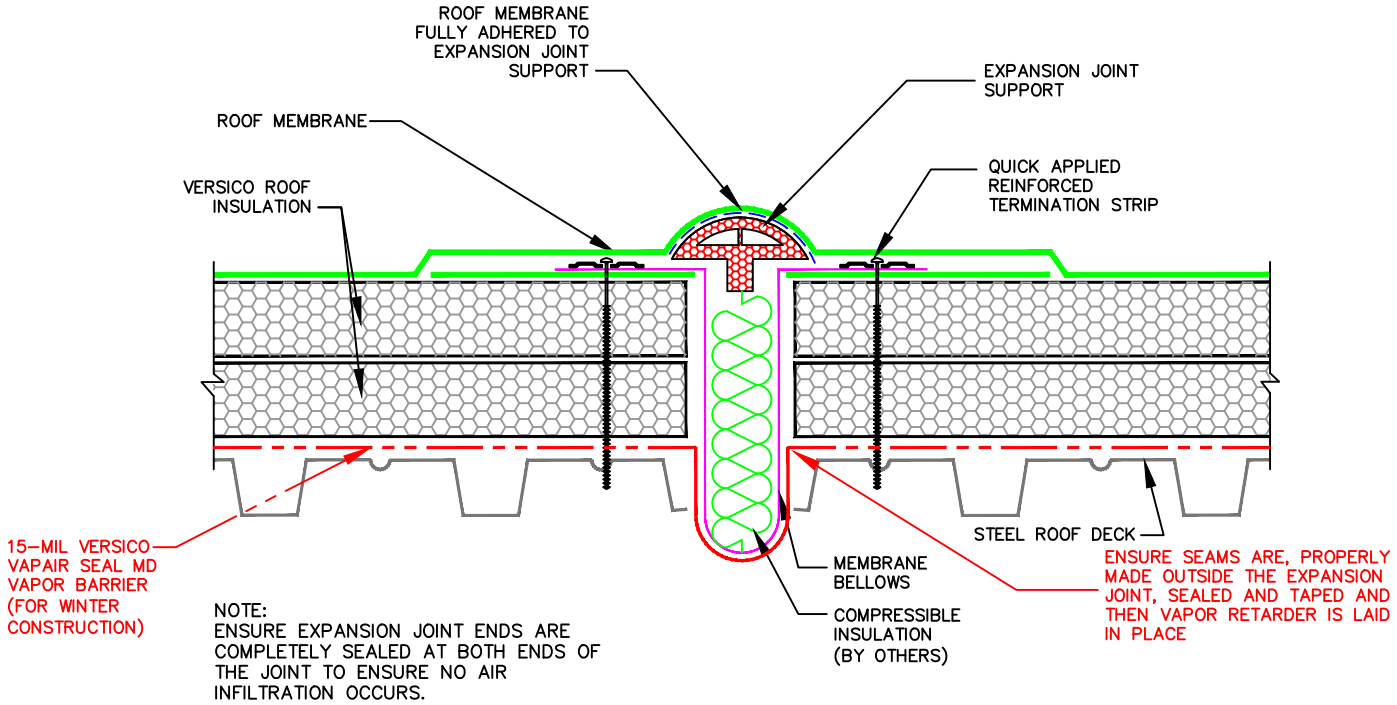
IWP: TRANSITION BETWEEN COLD & WARM SPACES

COLD STORAGE SHEET NO.

CS 5.2.1

COLD STORAGE ENVELOPE DETAILS

20160401



VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

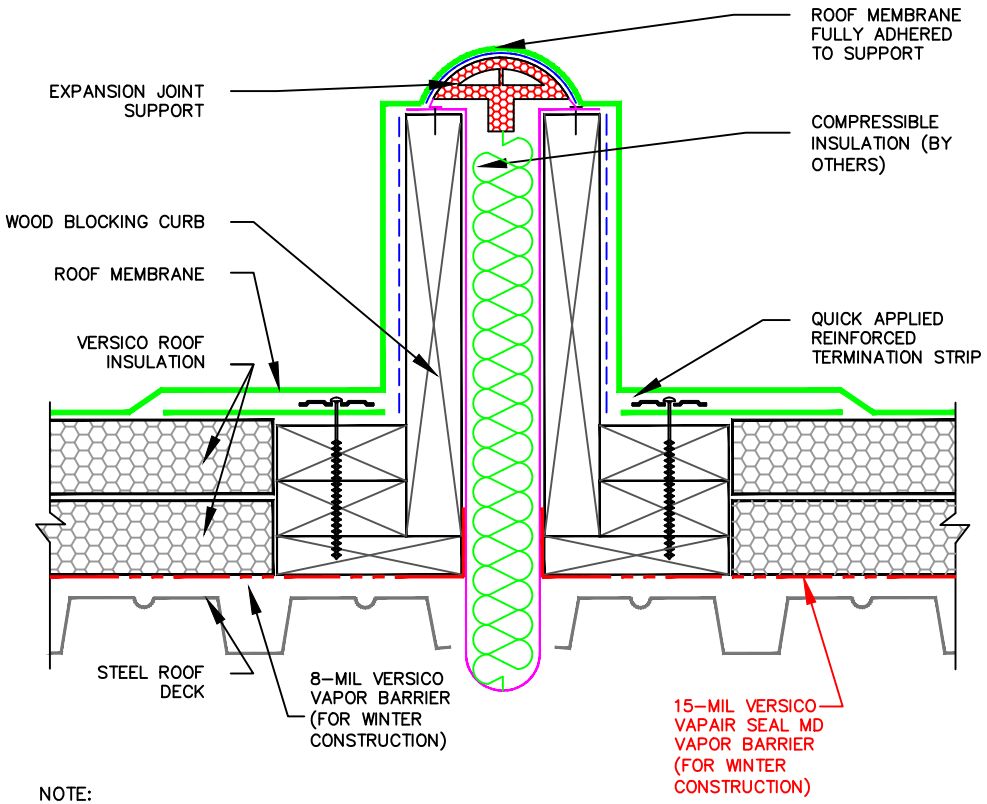
LOW PROFILE EXPANSION JOINT DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 5.3.1

20160401



NOTE:
ENSURE EXPANSION JOINT ENDS ARE COMPLETELY SEALED AT BOTH ENDS OF THE JOINT TO ENSURE NO AIR INFILTRATION OCCURS.

VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

CURBED EXPANSION JOINT DETAIL

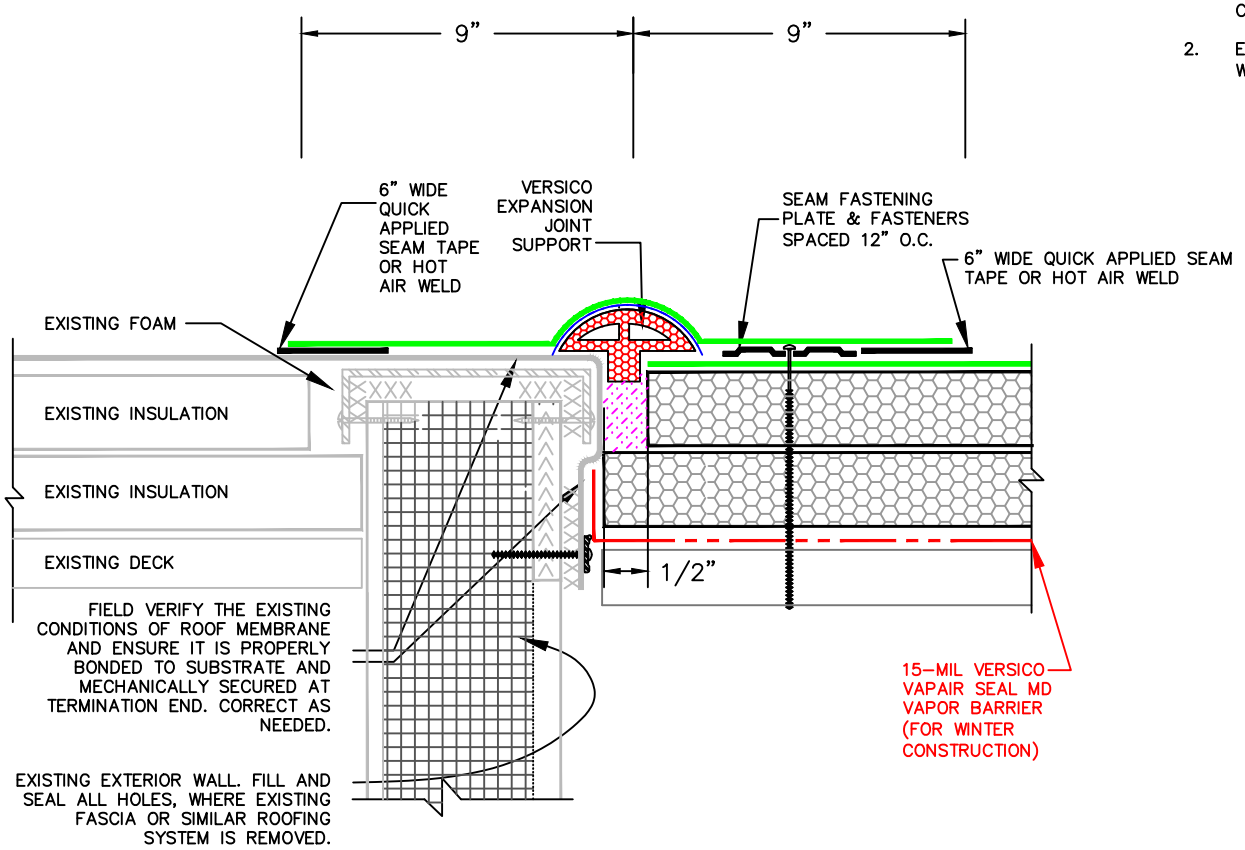
COLD STORAGE SHEET NO.

CS 5.4.1

COLD STORAGE ENVELOPE DETAILS

20160401

NOTES:
1. ENSURE AIR INFILTRATION FROM OUTSIDE IS COMPLETELY RESTRICTED.
2. ENSURE THE VERTICAL JOINTS OF ALL INSULATED WALL PANELS ARE SEALED (BY OTHERS).



EXISTING — **COLD** | **NEW ADDITION** — **COLD**

FOAM-IN-PLACE INSULATION

VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

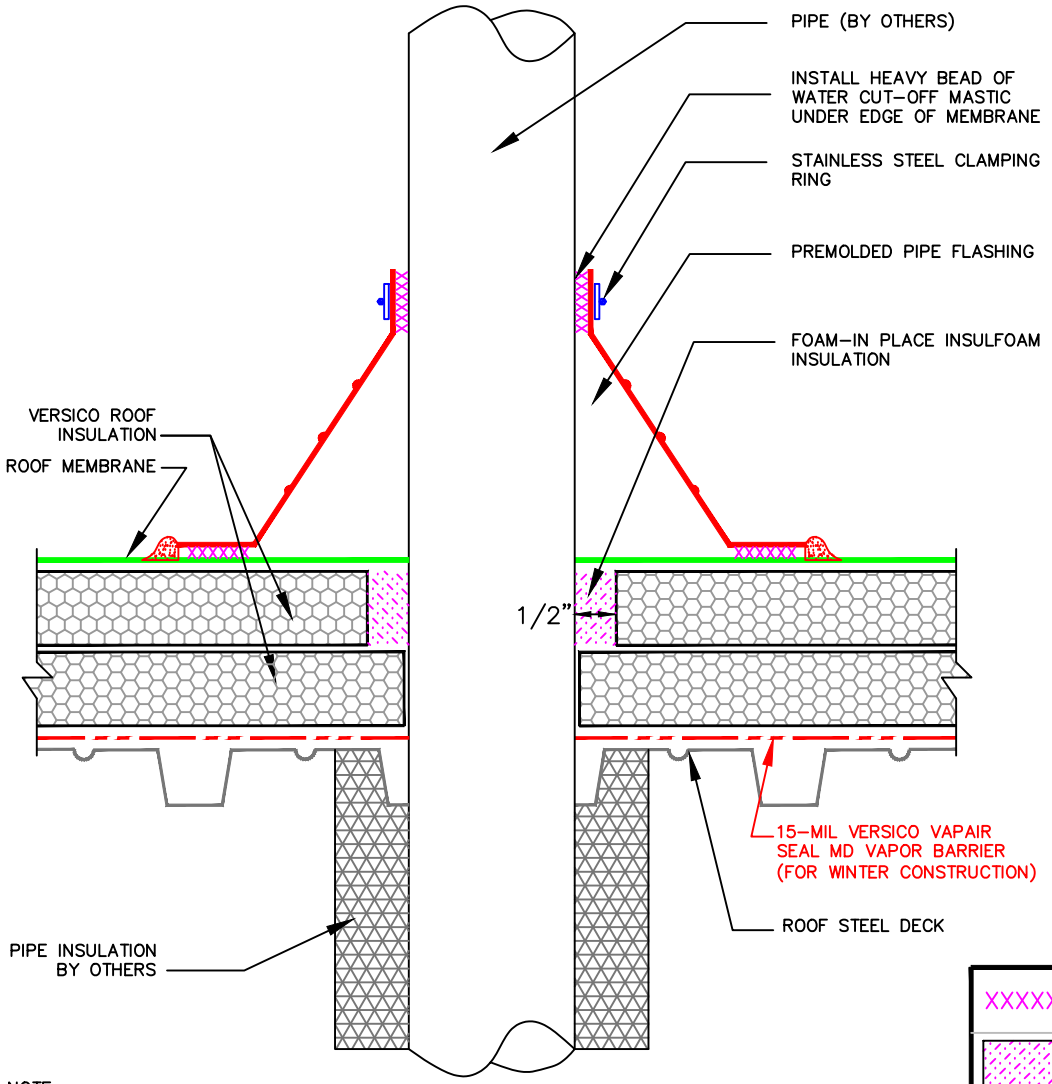
IWP: TIE-IN BETWEEN EXISTING COLD SPACE TO NEW COLD ADDITION

COLD STORAGE SHEET NO.

CS 5.5.1

COLD STORAGE ENVELOPE DETAILS

20160401



NOTE:
ENSURE AIR INFILTRATION FROM OUTSIDE IS COMPLETELY RESTRICTED.

XXXXXXXX	WATER CUT–OFF MASTIC
	FOAM–IN–PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

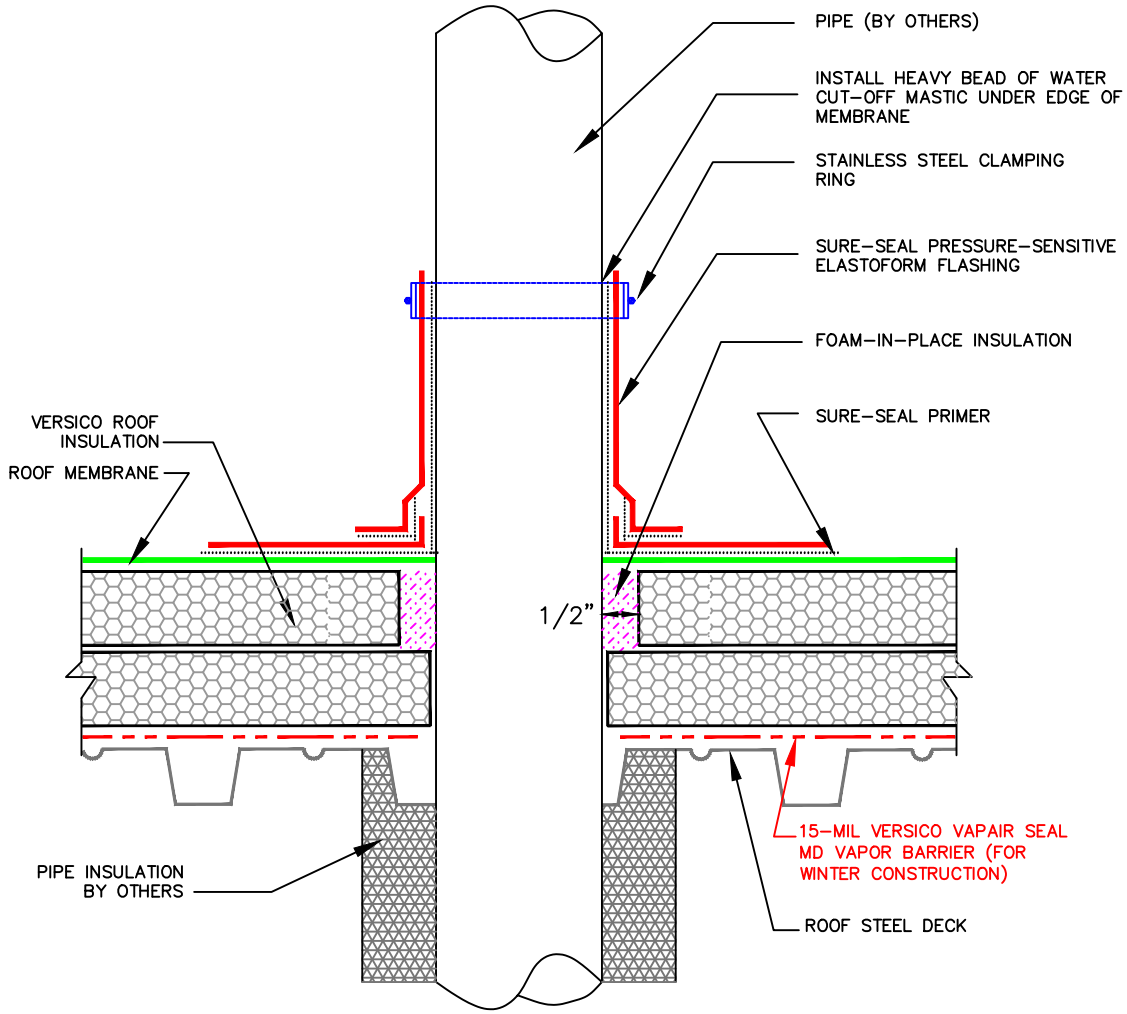
NON-INSULATED PIPE: PREMOLDED PIPE FLASHING DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 6.1.1

20160401



FOAM-IN-PLACE INSULATION

VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

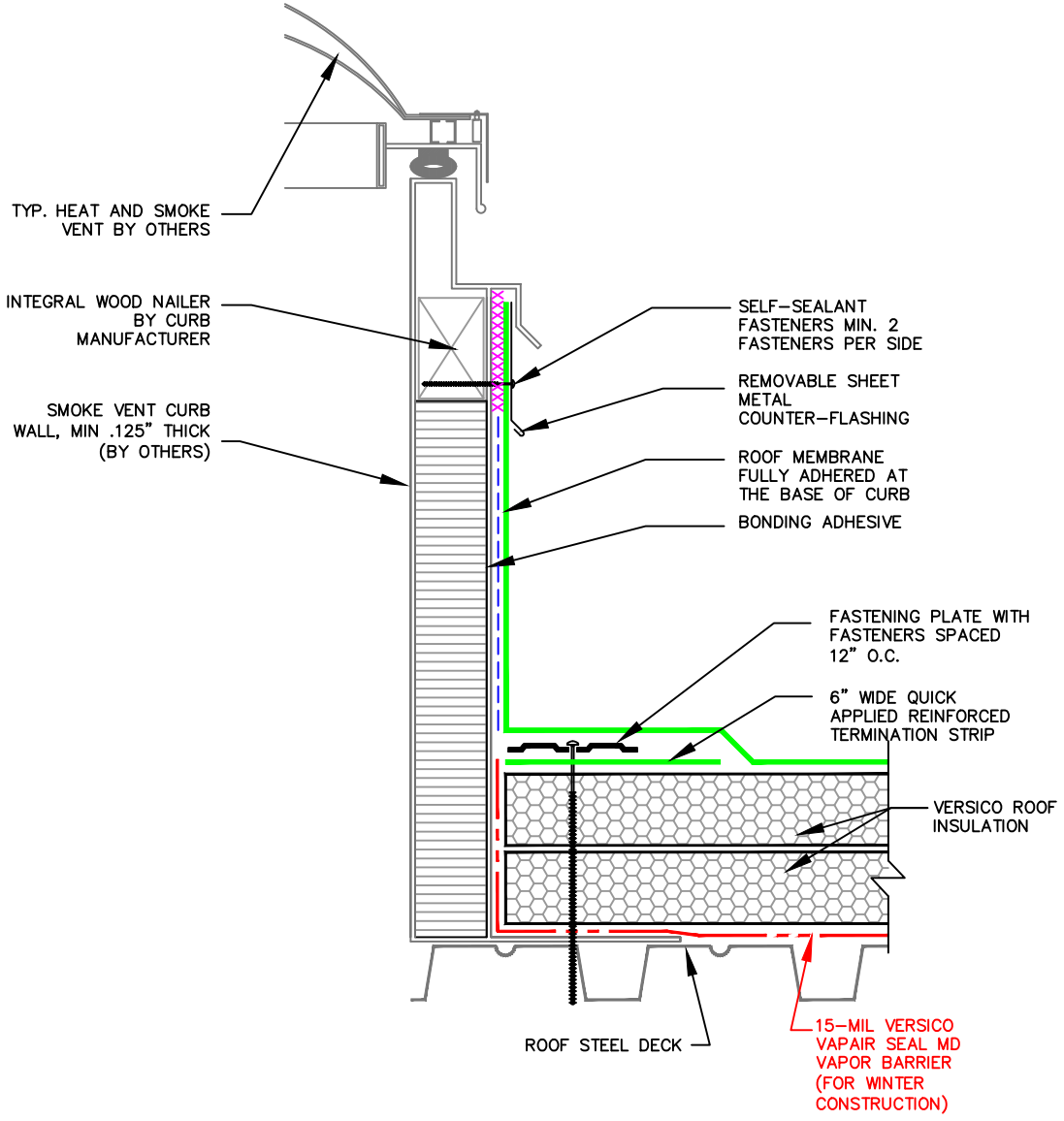
NON-INSULATED PIPE: FIELD-FABRICATED PIPE FLASHING DETAIL

COLD STORAGE SHEET NO.

CS 6.2.1

COLD STORAGE ENVELOPE DETAILS

201604016



VERSICO ROOFING SYSTEMS

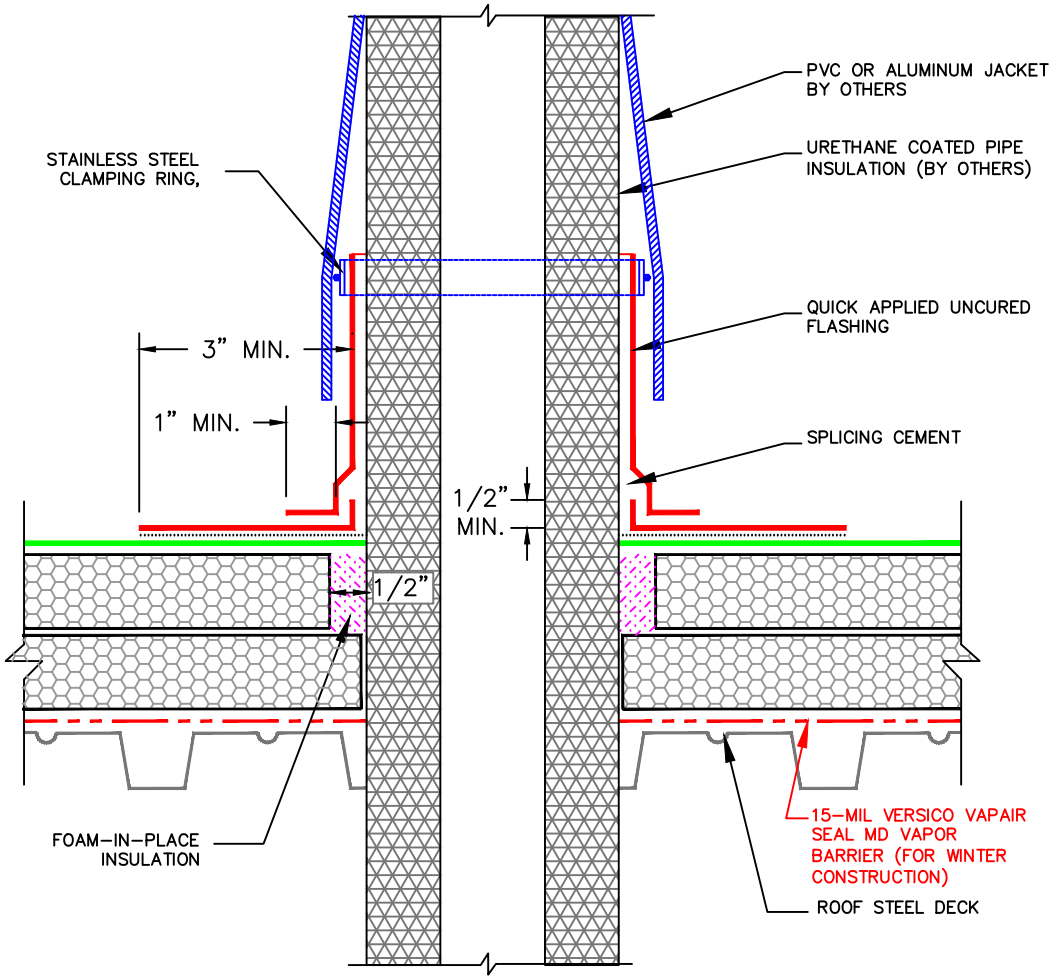
SMOKE VENT DETAIL

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 6.4.1

20160401



FOAM-IN-PLACE INSULATION

VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

INSULATED PIPE: FIELD-FABRICATED FLASHING DETAIL

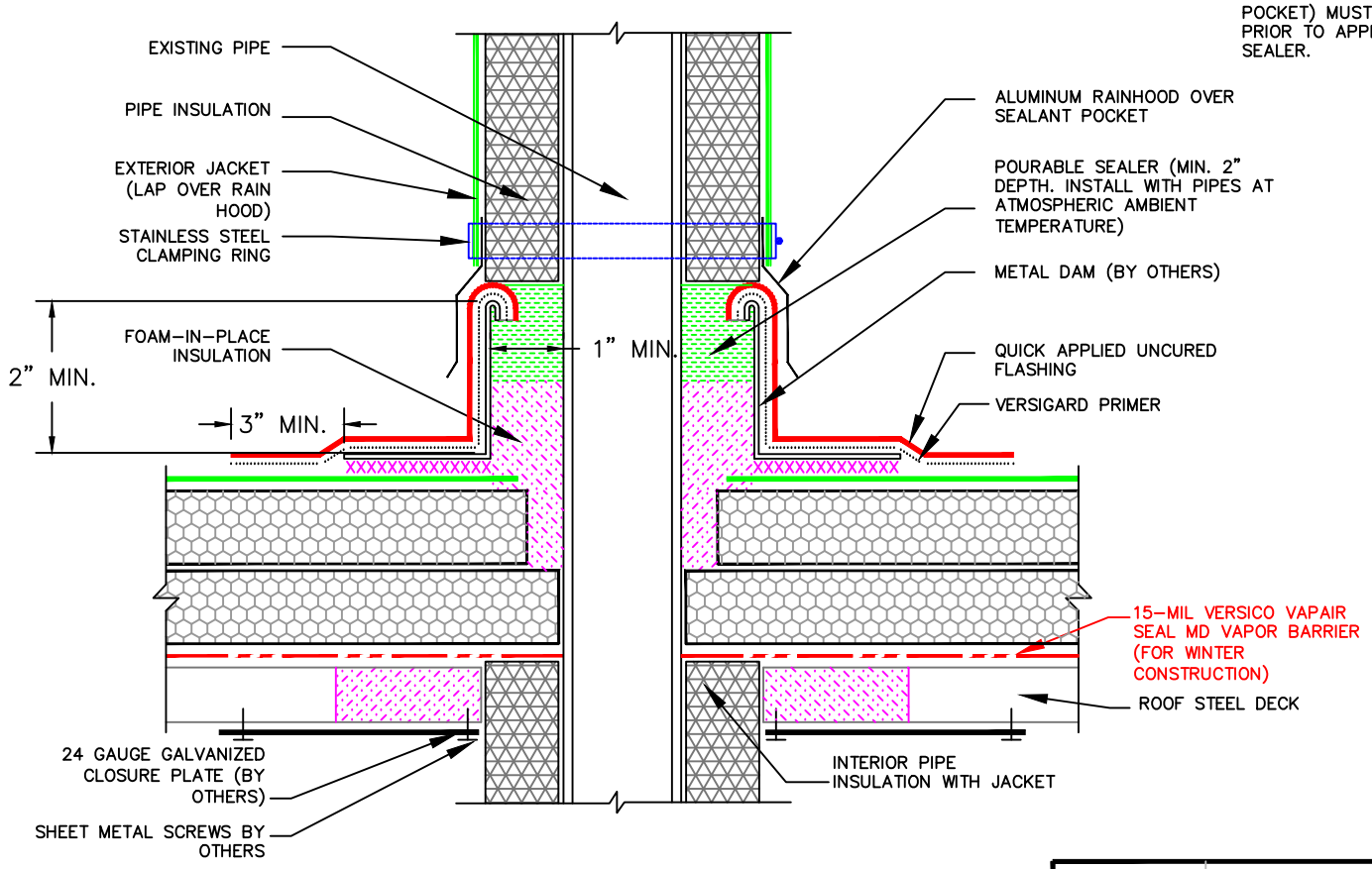
COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS 7.1.1

20160401

NOTES:
1. ENSURE AIR INFILTRATION FROM OUTSIDE IS COMPLETELY RESTRICTED.
2. PENETRATIONS, MEMBRANE, FLASHING AND METAL (INSIDE POCKET) MUST BE PRIMED PRIOR TO APPLYING POURABLE SEALER.



XXXXXXXX	WATER CUT–OFF MASTIC
	FOAM–IN–PLACE INSULATION
	VAPOR BARRIER AS REQUIRED FOR WINTER CONSTRUCTION TO PREVENT AGAINST CONSTRUCTION GENERATED MOISTURE.

VERSICO ROOFING SYSTEMS

INSULATED PIPE(S): POURABLE SEALER POCKET DETAIL

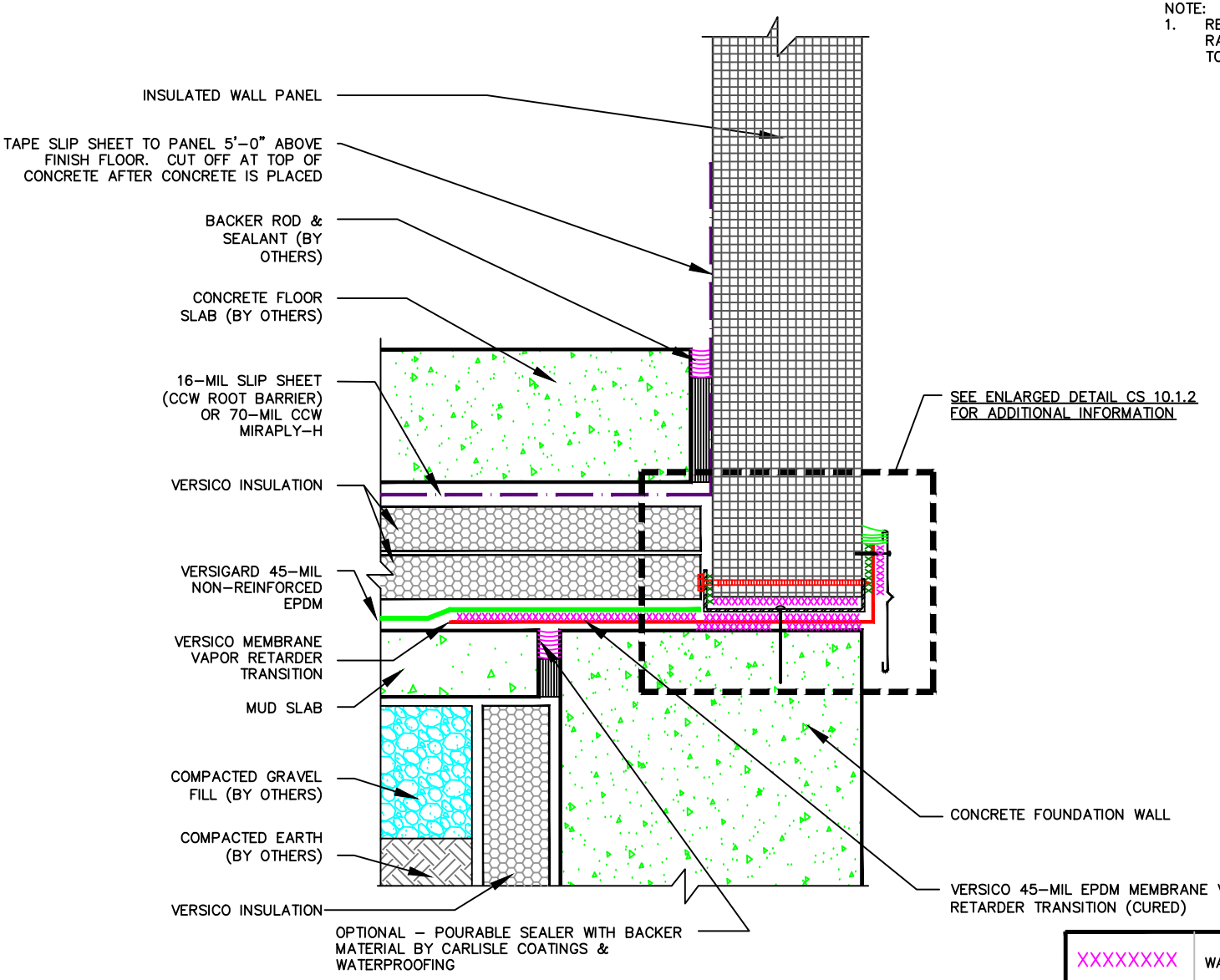
COLD STORAGE SHEET NO.

CS 7.2.1

COLD STORAGE ENVELOPE DETAILS

20160401

NOTE:
1. REFER TO DETAIL 10.2.1, WHERE RADIANT FLOOR HEATING SYSTEM TO BE INSTALLED.



XXXXXXXX	WATER CUT–OFF MASTIC

VERSICO ROOFING SYSTEMS

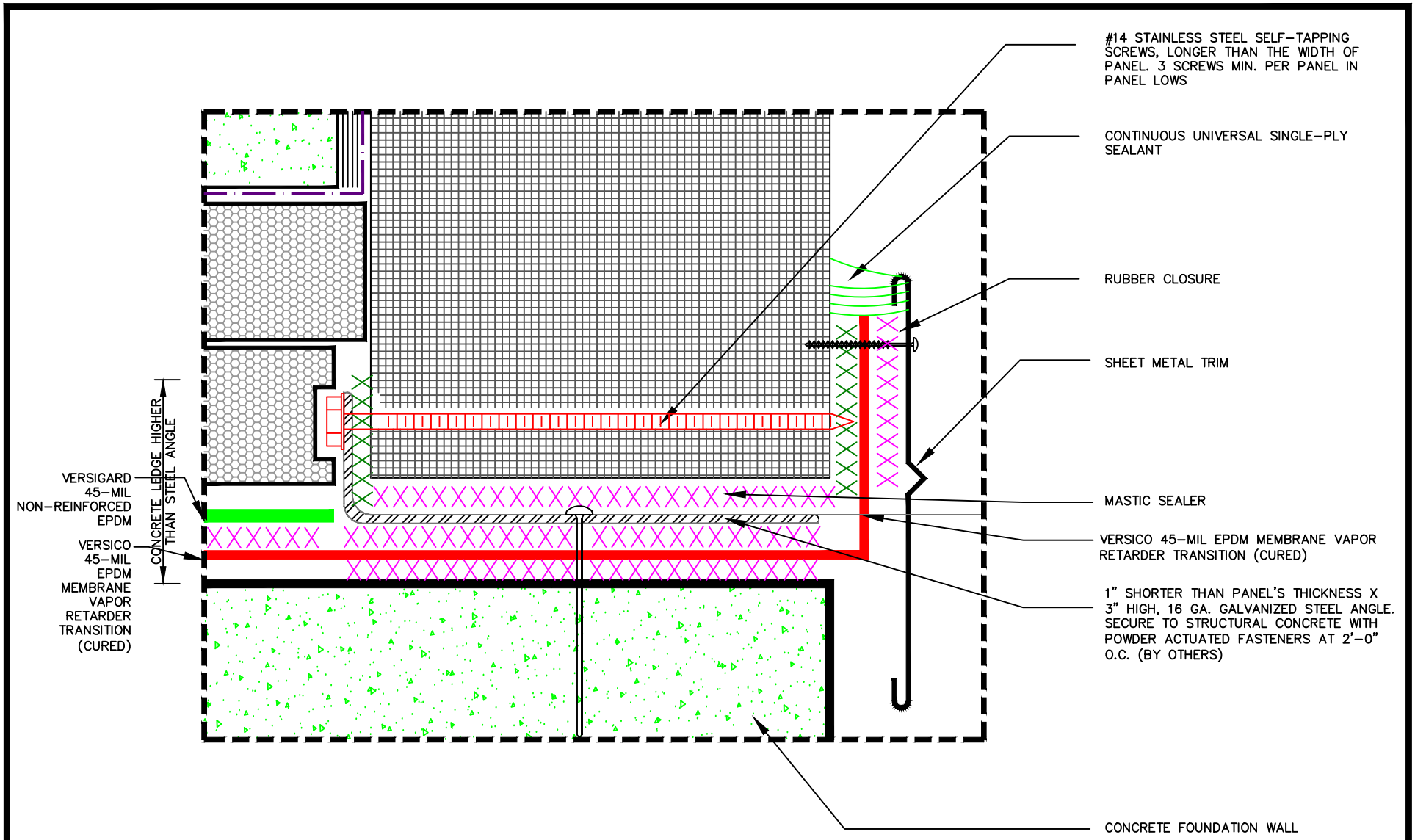
20160401

FLOOR SLAB WITHOUT RADIANT FLOOR HEATING

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS | 10.1.1



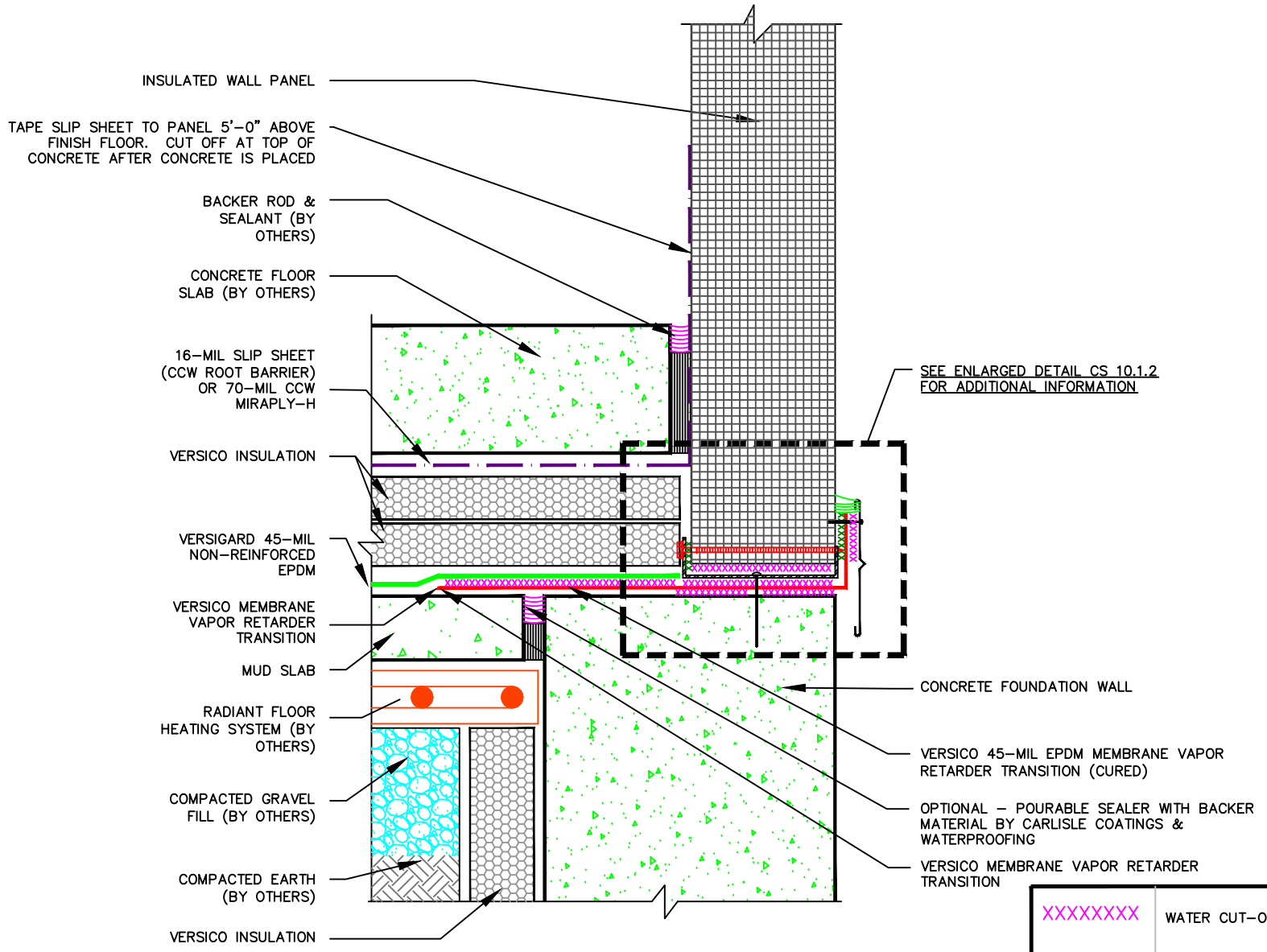
ENLARGED SECTION OF DETAIL 10.1.1

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS | 10.1.2

20160401



VERSICO ROOFING SYSTEMS

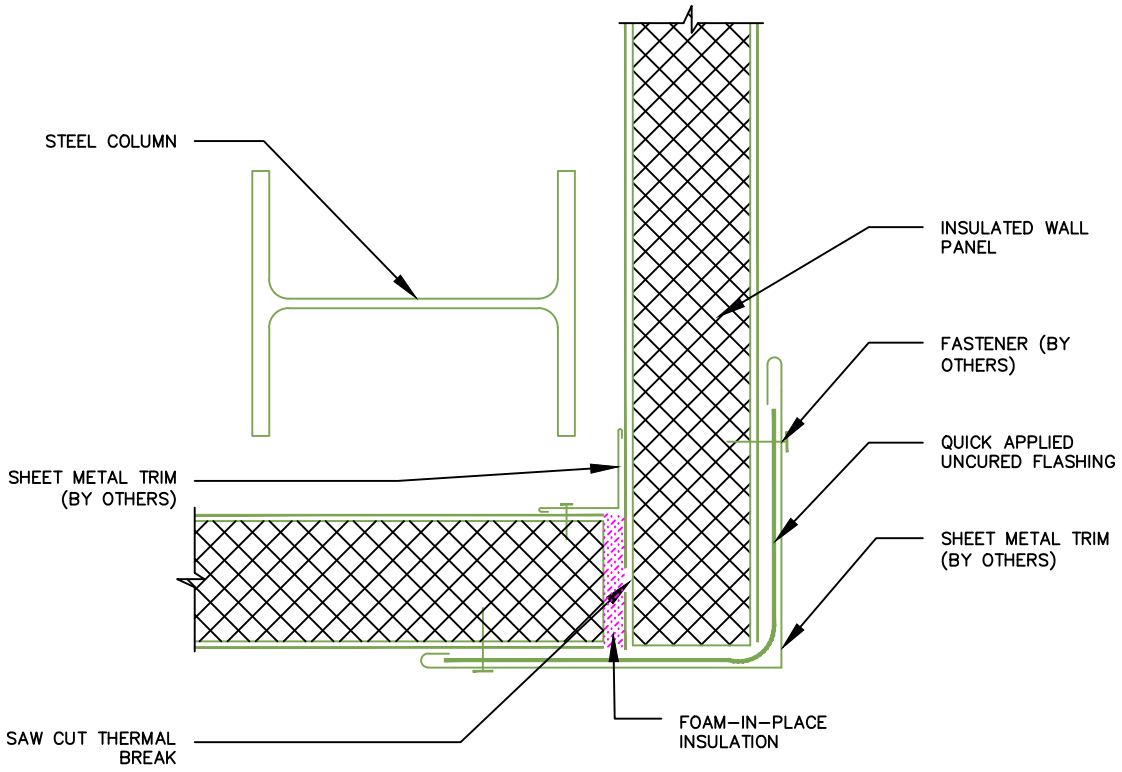
FLOOR SLAB WITH RADIANT FLOOR HEATING

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS | 10.2.1

20160401



VERSICO ROOFING SYSTEMS

PLAN DETAIL AT WALL CORNER

COLD STORAGE ENVELOPE DETAILS

COLD STORAGE SHEET NO.

CS | 11.1.1

20160401